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Coal Combustion Waste Impoundment
Round 5 - Dam Assessment Report

La Cygne Generating Station (Site 010)
Bottom Ash Settling, Upper and Lower AQC Ponds
Kansas City Power & Light Company
La Cygne, Kansas

Prepared for:

United States Environmental Protection Agency
Office of Resource Conservation and Recovery

Prepared by:

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INTRODUCTION, SUMMARY CONCLUSIONS AND RECOMMENDATIONS

The release of over five million cubic yards from the Tennessee Valley Authority's Kingston, Tennessee facility in December 2008, which flooded more than 300 acres of land, damaging homes and property, is a wake-up call for diligence on coal combustion waste disposal units. We must marshal our best efforts to prevent such catastrophic failure and damage. A first step toward this goal is to assess the stability and functionality of the ash impoundments and other units, then quickly take any needed corrective measures.

This assessment of the stability and functionality of the La Cygne Generating Station's Bottom Ash Settling Pond and Upper and Lower AQC Ponds is based on a review of available documents and on the site assessment conducted by Dewberry personnel on Tuesday, 21 September 2010. We found the supporting technical documentation adequate (Section 1.1.3). As detailed in Section 1.2, there are several recommendations based on field observations that may help to maintain a safe and trouble-free operation.

In summary, the La Cygne Generating Station's Upper and Lower AQC Ponds are **SATISFACTORY** for continued safe and reliable operation, with no recognized existing or potential management unity safety deficiencies.

PURPOSE AND SCOPE

The U.S. Environmental Protection Agency (EPA) is embarking on an initiative to investigate the potential for catastrophic failure of Coal Combustion Surface Impoundments (i.e., management unit) from occurring at electric utilities in an effort to protect lives and property from the consequences of a dam failure or the improper release of impounded slurry. The EPA initiative is intended to identify conditions that may adversely affect the structural stability and functionality of a management unit and its appurtenant structures; to note the extent of deterioration, status of maintenance and/or a need for immediate repair; to evaluate conformity with current design and construction practices; and to determine the hazard potential classification for units not currently classified by the management unit owner or by a state or federal agency. The initiative will address management units that are classified as having a Less-than-Low, Low, Significant or High Hazard Potential ranking. (For Classification, see pp. 3-8 of the 2004 Federal Guidelines for Dam Safety)

In February 2009, the EPA sent letters to coal-fired electric utilities seeking information on the safety of surface impoundments and similar facilities that receive liquid-borne material that store or dispose of coal combustion waste. This letter was issued under the authority of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Section 104(e), to assist the Agency in assessing the structural stability and functionality of such

management units, including which facilities should be visited to perform a safety assessment of the berms, dikes, and dams used in the construction of these impoundments.

EPA requested that utility companies identify all management units including surface impoundments or similar diked or bermed management units or management units designated as landfills that receive liquid-borne material used for the storage or disposal of residuals or by-products from the combustion of coal, including, but not limited to, fly ash, bottom ash, boiler slag, or flue gas emission control residuals. Utility companies provided information on the size, design, age and the amount of material placed in the units. The EPA used the information received from the utilities to determine preliminarily which management units had or potentially could have High Hazard Potential ranking.

The purpose of this report is **to evaluate the condition and potential of waste release from management units that have not been rated for hazard potential classification**. This evaluation included a site visit. Prior to conducting the site visit, a two-person team reviewed the information submitted to EPA, reviewed any relevant publicly available information from state or federal agencies regarding the unit hazard potential classification (if any) and accepted information provided via telephone communication with the management unit owner. Also, after the field visit additional information was received by Dewberry & Davis LLC about the La Cygne Generating Station's Bottom Ash Settling Pond and Upper and Lower AQC Ponds that was reviewed and used in preparation of this report.

Factors considered in determining the hazard potential classification of the management units(s) included the age and size of the impoundment, the quantity of coal combustion residuals or by-products that were stored or disposed of in these impoundments, its past operating history, and its geographic location relative to down gradient population centers and/or sensitive environmental systems.

This report presents the opinion of the assessment team as to the potential of catastrophic failure and reports on the condition of the management unit(s).

LIMITATIONS

The assessment of dam safety reported herein is based on field observations and review of readily available information provided by the owner/operator of the subject coal combustion waste management unit(s). Qualified Dewberry engineering personnel performed the field observations and review and made the assessment in conformance with the required scope of work and in accordance with reasonable and acceptable engineering practices. No other warranty, either written or implied, is made with regard to our assessment of dam safety.

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1.0 CONCLUSIONS AND RECOMMENDATIONS

1.1 CONCLUSIONS

Conclusions are based on visual observations from a one-day site visit, 21 September 2010, and review of technical documentation provided by Kansas City Power & Light Company.

1.1.1 Conclusions Regarding the Structural Soundness of the Management Unit(s)

Slope stability and seepage analyses for the embankments were performed and were provided for review. A Geotechnical Evaluation of AQC Ponds – Kansas City Power & Light: La Cygne Generating Station; September 2010 by URS Corporation was provided for review and are included in Appendix A, Document 1. The embankments, inlets, outlets and spillway (only for the Lower AQC Pond) of each of the three ponds appear to be structurally sound based on Dewberry engineers' observations during the site visit and review of the evaluation document. The structural soundness of the management units is satisfactory for continued service.

Bottom Ash Settling Pond

This pond was determined to be incised into the site. The pond and its associated appurtenances appeared to be in good condition and structurally sound. Since it was incised, further evaluation of the unit was not performed.

Upper AQC Pond

This pond was the first in the series of the AQC (Ash Quality Control) ponds. Its primary function is a settling pond. There was not any appearance of sloughing or deterioration of the embankment structures.

There were no trees growing on the outer levees, however, in a couple of areas along the interior pond levees, woody brushy vegetation (1.0"-1.5" Saltceder: sp. *Tamarix Aphylla*) was growing. There was a considerable amount of uncut vegetation (one foot in height or higher) that existed on the interior pond levees. The plant operator indicated that the vegetation was planted to increase the rate of evapotranspiration for the sludge.

The embankments, inlets and outlets appear to be structurally sound based on a Dewberry engineers' observations during the site visit. They should be satisfactory for continued service. The pond and its associated appurtenances appeared to be in good condition and structurally sound.

Lower AQC Pond

This pond was the second in the series of the AQC (Ash Quality Control) ponds. Its primary function is that of a storage pond. No sloughing or deterioration of the embankment structures was observed.

There were no trees growing on the outer or inner levees. The embankments, inlets and outlets appear to be structurally sound based on a Dewberry engineers' observations during the site visit. They should be satisfactory for continued service. The pond and its associated appurtenances appeared to be in good condition and structurally sound.

1.1.2 Conclusions Regarding the Hydrologic/Hydraulic Safety of the Management Unit(s)

Hydrologic/Hydraulic Safety analyses for the embankments were performed and were provided for review: A Geotechnical Evaluation Of AQC Ponds – Kansas City Power & Light: La Cygne Generating Station; September 2010 by URS Corporation was provided for review and is included in Appendix A, Document 1.

All ponds are located uphill and adjacent to Lake La Cygne, so any materials (water and solids) released from the ponds in the event of a breach or failure of the pond embankments would enter the lake. The potential that a rapid release from the ponds could cause Lake La Cygne dam to overtop is very low. A conservative estimate of the impact of a breach or failure of the ponds was made by assuming that the ponds failed during the peak of the hydrograph from the design storm event. The results show that that all spillage would be contained within Lake La Cygne.

1.1.3 Conclusions Regarding the Adequacy of Supporting Technical Documentation

The supporting technical documents appear to be adequate; pertinent documents are included in Appendix A (listed in the Table of Contents).

1.1.4 Conclusions Regarding the Description of the Management Unit(s)

The description of the management units provided by Kansas City Power & Light for the La Cygne Generating Station was an accurate representation of what was observed in the field.

1.1.5 Conclusions Regarding the Field Observations

Dewberry staff was provided access to all areas in the vicinity of the management units required to conduct a thorough field observation. The conclusions provided in this section reflect the engineering team's field observations. The team observed woody brushy vegetation growth on the interior levee of the Upper AQC Pond. This issue needs to be addressed in the near future before trees can develop.

1.1.6 Conclusions Regarding the Adequacy of Maintenance and Methods of Operation

There appears to be no immediate concerns other than those noted in Section 1.1.5.

1.1.7 Conclusions Regarding the Adequacy of the Surveillance and Monitoring Program

The current instrumentation monitoring plan and Operation and Maintenance Plan for embankment performance of the management units are adequate and include a monitoring plan for groundwater quality. Additionally, daily drive-by inspections are conducted by plant personnel. These inspections are being documented.

1.1.8 Classification Regarding Suitability for Continued Safe and Reliable Operation

The field observations and review of documents lead the Dewberry team to conclude that all of the ponds at the La Cygne Generating Station (*Upper and Lower AQC Ponds*) appear to be adequate for continued safe and reliable operation. All three of these ponds can be classified as follows:

POND NAME	HAZARD POTENTIAL
Lower AQC	**LOW**
Upper AQC	**LOW**

This classification is a result of the lack potential environmental impacts and outside property destruction if there were a catastrophic failure.

The facility is **SATISFACTORY** for continued safe and reliable operation. No existing or potential management unit safety deficiencies

are recognized. Acceptable performance is expected under all applicable loading conditions (static, hydrologic, seismic) in accordance with the applicable criteria.

1.2 RECOMMENDATIONS

1.2.1 Recommendations Regarding the Structural Stability

No recommendations are necessary.

1.2.2 Recommendations Regarding the Hydrologic/Hydraulic Safety

No recommendations are necessary.

1.2.3 Recommendations Regarding the Supporting Technical Documentation

No recommendations are necessary

1.2.4 Recommendations Regarding the Description of the Management Unit(s)

No recommendations are warranted.

1.2.5 Recommendations Regarding the Field Observations

It is recommended that Kansas City Power & Light remove the brushy vegetation from the interior slope of the Upper AQC Pond. This brush needs to be removed from the levees and within 25 feet from the toe of the levee slope. This should be done before trees can develop.

1.2.6 Recommendations Regarding the Maintenance and Methods of Operation

Continue the present operations and monitoring program and remove woody brushy vegetation growth on the interior levee of the Upper AQC Pond.

1.2.7 Recommendations Regarding the Surveillance and Monitoring Program

It is recommended that Kansas City Power & Light develop a regular surveillance program that logs the location of field monuments and piezometer readings at least once a year.

1.2.8 Recommendations Regarding Continued Safe and Reliable Operation

No recommendations are warranted other than addressing vegetation growth on the Upper AQC Pond slope.

1.3 PARTICIPANTS AND ACKNOWLEDGEMENT

1.3.1 List of Participants

Paul M. Ling, JD, PE – Environmental Manager – KCP&L
Theresa Goin – Environmental Compliance Administrator – KCP&L
Mark C. Adams, PE – Sr. Civil/Power Production Engineer – KCP&L
Gordon Turner – Fuel Yard Superintendent – KCP&L
Michael J. McLaren, SE, PE – Structural Engineer – Dewberry
Andrew J. Cueto, PE, PMP – Civil Engineer – Dewberry

1.3.2 Acknowledgement and Signature

We acknowledge that the La Cygne Generating Station management units referenced herein were assessed on 21 September 2010.

Michael J. McLaren, S.E., P.E.

Andrew J. Cueto, P.E., PMP

2.0 DESCRIPTION OF THE COAL COMBUSTION WASTE MANAGEMENT UNIT(S)

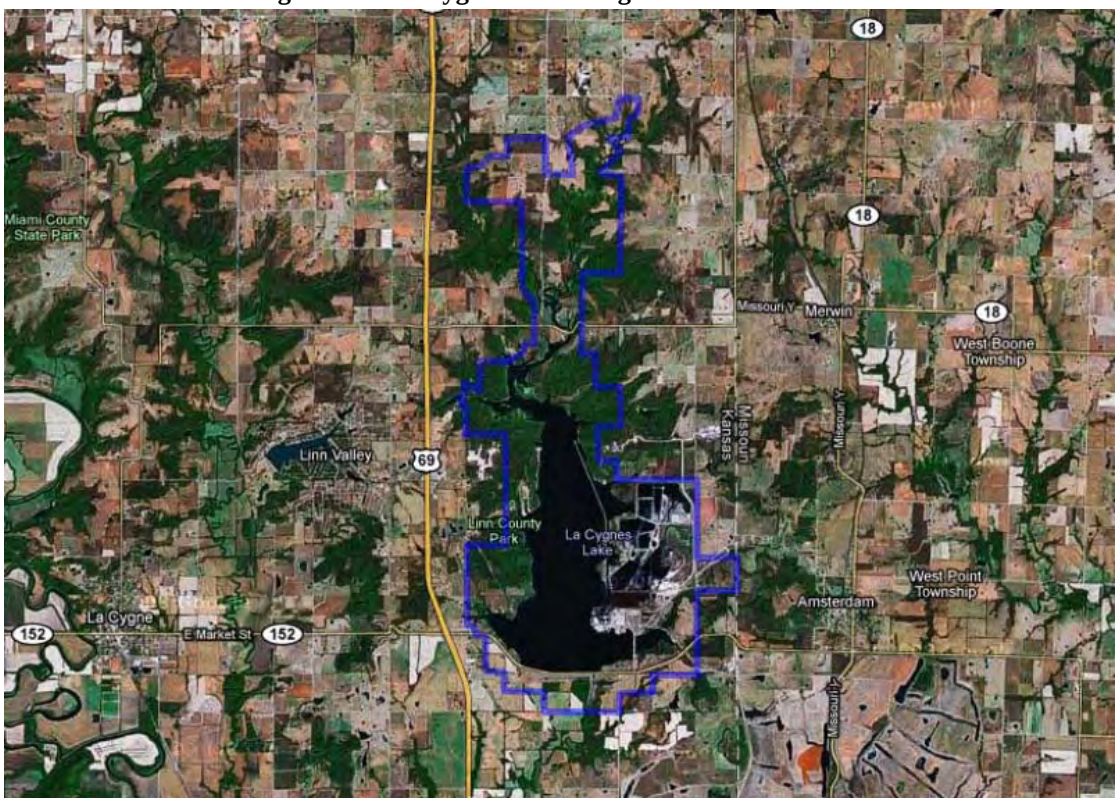
2.1 LOCATION AND GENERAL DESCRIPTION

KANSAS CITY POWER & LIGHT COMPANY operates the La Cygne Generating Station, a coal fired electric generation plant located in Linn County, Kansas, more particularly described as follows:

> Section 27 except the West Y2 of the Northwest ~ thereof; the East ~ of the Northeast ~ of Section 33; and the North Y2 of Section 34, all in Township 19 South, Range 2S East, Linn County, Kansas.

La Cygne is located in east central Kansas approximately fifty miles south of Kansas City. The La Cygne Generating Station location is shown in Figure 2.1.

Figure 2-1. La Cygne Generating Station Location



The power plant consists of two coal-fired generating units, presently rated at 848 megawatts and 715 megawatts, which burn about 5,000,000 tons of coal per year, mostly western low-sulfur coal. The 7,500-acre site contains a 2,600-acre cooling water lake, the generation station, and 751 acres permitted for on-site resource storage, recycling and waste disposal.

La Cygne Generating Station has two main impoundments containing waste materials from their air quality control systems at the station and a third smaller bottom ash pond. These are referred to as air quality control (AQC) ponds, consisting of the Lower AQC pond, the Upper AQC pond, and the Bottom Ash Pond. The pond locations are shown in Figure 2.2.

Figure 2-2

The Lower AQC pond receives flue gas desulfurization sludge and the Bottom Ash Pond receives bottom ash from the power plant. The ponds were built as part of the original power plant construction. The design plans for these ponds were prepared by Ebasco Services Incorporated and are dated in the early 1970s. Selected sheets showing design details are included in Appendix A.

The Upper AQC pond was constructed in the late 1970s to provide additional storage for sluiced flue gas desulfurization sludge and is currently in service. The pond was designed by Woodward-Clyde Consultants (now URS); design plans are dated 1978. The original design plans for the pond are included in Appendix A.

Currently, flue gas desulfurization sludge from the plant is sluiced to the Upper AQC pond. Overflow from the Upper AQC pond is directed to the Lower AQC pond through the upper pond's principal spillway. The ponds are managed as a non-discharge facility. Water levels are managed through enhanced evaporation and by drawing water from the Lower AQC pond for power plant operations.

Both the Upper and Lower AQC ponds are bounded by earth fill embankments which provide containment of the ash materials. A geotechnical evaluation discussed later in this report included drilling exploratory borings, installing piezometers, conducting a video survey of the principal spillway conduit of the upper pond, and conducting laboratory tests on embankment and foundation soils.

The dimensions and parameters for the various embankments are listed below:

Table 2.1: Summary of Dam Dimensions and Size

	Bottom Ash Pond (incised into ground)
Dam Height (ft)	12 (above lake level)
Crest Width (ft)	50
Length (ft)	1700
Surface Area (ac)	1.8
Side Slopes (upstream) H:V	2:1
Side Slopes (downstream) H:V	n/a
	Lower AQC Pond
Dam Height (ft)	24
Crest Width (ft)	15
Length (ft)	10,500
Surface Area (ac)	163
Side Slopes (upstream) H:V	2:1
Side Slopes (downstream) H:V	2.5:1

Table 2.1: Summary of Dam Dimensions and Size (cont.)	
	Upper AQC Pond
Dam Height (ft)	45
Crest Width (ft)	16
Length (ft)	18,000
Surface Area (ac)	332
Side Slopes (upstream) H:V	2:1
Side Slopes (downstream) H:V	2.5:1

2.2 SIZE AND HAZARD CLASSIFICATION

The classification for size based on the height of the dam and storage capacity should be in accordance with Table 2.2a. The height of the dam is established with respect to the maximum storage potential measured from the natural bed of the stream or watercourse at the downstream toe of the barrier, or if it is not across a stream or watercourse, the height from the lowest elevation of the outside limit of the barrier, to the maximum water storage elevation. For the purpose of determining project size, the maximum storage elevation may be considered equal to the top of dam elevation. Size classification may be determined by either storage or height, whichever gives the larger size category.

Table 2.2a: USACE ER 1110-2-106 Size Classification		
	Impoundment	
Category	**Storage (Ac-ft)**	**Height (ft)**
Small	50 and < 1,000	25 and < 40
Intermediate	1,000 and < 50,000	40 and < 100
Large	> 50,000	> 100

The Hazard Potential Classification System for Dams is based on the probable loss of human life and the potential for economic losses, environmental damage, and/or disruption to lifelines caused by failure of mis-operation of a dam or its appurtenances. This Hazard Potential Classification System for Dams recognizes that the failure or mis-operation of any dam or water-retaining structure, no matter how small, represents a potential danger to downstream life and property. This system considers improbable loss of life to exist where persons are only temporarily in the potential inundation area. Dams assigned the high hazard potential classification are those where failure or mis-operation will probably cause loss of

human life. The classification for Hazard is presented in Table 2.2b and is based on the FEMA Federal Guidelines for Dam Safety.

Table 2.2b: FEMA Federal Guidelines for Dam Safety Hazard Classification		
	Loss of Human Life	**Economic, Environmental, Lifeline Losses**
Low	None Expected	Low and generally limited to owner
Significant	None Expected	Yes
High	Probable. One or more expected	Yes (but not necessary for classification)

The La Cygne Generating Station has two main impoundments containing waste materials from their air quality control systems, the Lower and Upper AQC Ponds, and a third smaller Bottom Ash Pond. Table 2.2c details the classification of each of these impoundments with respect to Size and Hazard Classification.

Table 2.2c: Summary of Dam Classifications						
Pond/Dam Name	**Size Classification**			**Hazard Classification**		
	Small	**Intermediate**	**Large**	**Low**	**Significant**	**High**
Bottom Ash Pond	X			X		
Lower AQC Pond	X			X		
Upper AQC Pond		X		X		

As seen in Table 2.2c, the La Cygne Generating Station's Ponds are relatively small, ranging from small for the Bottom Ash and Lower AQC Ponds to intermediate for the Upper AQC Pond. The hazard risk for all three ponds was determined to be **LOW** due to the fact that a catastrophic failure of all three ponds would be contained within the La Cygne Generating Station's cooling water lake. Therefore, there would be no economic, environmental, lifeline losses to outside property owners.

2.3 AMOUNT AND TYPE OF RESIDUALS CURRENTLY CONTAINED IN THE UNIT(S) AND MAXIMUM CAPACITY

The Upper AQC pond receives scrubber sludge sluiced from Unit 1. The Lower AQC pond is the original pond into which Unit 1 scrubber sludge was deposited. It now serves as a tertiary decant basin and surge pond for recycling AQC system waters. The Bottom Ash Pond receives bottom ash from Units 1 and 2. The Pond is incised into the pad originally constructed for the facility. It is dredged regularly and dredged materials are taken to the dry landfill on site.

Table 2.3 provides capacity information for each pond. Currently, 192 acre-feet of solid waste are disposed annually. After 2010, sales of recyclable materials will cease and all solid waste products will be disposed of within the AQC ponds or the dry ash landfill. Starting in 2011, an estimated 316 acre-feet of waste will be disposed of on an annual basis (equivalent to 627,000 tons of solid waste) at La Cygne. Assuming current waste disposal rates remain unchanged and that recycled sales will not be pursued after 2010, the solid waste disposal areas should reach final capacity around 2058. By that time, the solid waste disposal areas will be full and ready for preparation for closure procedures.

Table 2.3: Maximum Capacity of Unit	
Bottom Ash Pond	
Surface Area (acre)[1]	1.8
Current Storage Capacity (cubic yards)[1]	19,000
Current Storage Capacity (acre-feet)	11.8
Total Storage Capacity (cubic yards)[1]	19,000
Total Storage Capacity (acre-feet)	11.8
Crest Elevation (feet)	852.5
Normal Pond Level (feet)	850.0

Table 2.3: Maximum Capacity of Unit (cont.)	
Lower AQC Pond	
Surface Area (acre)[1]	163
Current Storage Capacity (cubic yards)[1]	2,500,000
Current Storage Capacity (acre-feet)	1,549.6
Total Storage Capacity (cubic yards)[1]	2,500,000
Total Storage Capacity (acre-feet)	1,549.6
Crest Elevation (feet)	864
Normal Pond Level (feet)	861
Upper AQC Pond Name	
Surface Area (acre)[1]	332
Current Storage Capacity (cubic yards)[1]	6,250,000
Current Storage Capacity (acre-feet)	3874
Total Storage Capacity (cubic yards)[1]	12,500,000
Total Storage Capacity (acre-feet)	7,747.9
Crest Elevation (feet)	890
Normal Pond Level (feet)	887

2.4 PRINCIPAL PROJECT STRUCTURES

2.4.1 Earth Embankment

Lower AQC Pond - Plans prepared by Ebasco Services show that the Lower AQC Pond was formed by an approximately 10,500-foot-long side hill embankment. The plans do not provide details on the embankment materials, it is assumed that the embankment consists entirely of compacted native clay. No internal drainage for the embankment is shown. The embankment for the Lower AQC pond was constructed as part of the original power plant construction. It was built in accordance with engineering plans and specifications (included in Appendix A) and its construction was overseen by an independent construction manager. The embankments were constructed on ground undisturbed by power plant operations. The plans detailed clearing and grubbing of the construction site, as well as the keying in of the embankment as it was compacted.

Upper AQC Pond - is formed by an approximately 18,000-foot-long embankment. The Upper AQC pond was constructed from a signed and sealed set of construction drawings (included in Appendix A). The design documents show that a typical embankment section has an impervious upstream section and a random zone on the downstream slope. The upstream and downstream slopes are inclined at 2.5H to 1V. The width of the dam crest varies with the height of the embankment, ranging from 13 feet where the embankment is shortest to 18 feet where the embankment is

tallest. The height of the embankment varies from approximately 15 feet along the northwest side to about 45 feet on the southeast side.

It is reported that the borrow materials for the embankment were obtained from within the reservoir. Borings drilled within the reservoir during the design investigation show that the general subsurface profile consisted of medium to high plastic residual clays over shale bedrock. The upper portion of the shale was weathered and plastic. With depth, the weathering decreased and the shale became harder and retained its laminated structure. The residual clays and weathered, plastic shale were excavated and used to construct the embankment. The embankment is zoned with an internal impervious zone, an external random zone, and a horizontal blanket drain near the downstream toe.

The embankment was designed and constructed with an internal drainage system to intercept seepage through the embankment. The drain was constructed of freely draining bottom ash with little fines and a gradation like a poorly graded medium to coarse sand. Internal drainage is provided along the entire length of the embankment.

2.4.2 Outlet Structures

The Lower AQC Pond is designed as a non-discharge unit. An emergency overflow spillway was provided for the Lower AQC Pond. Intake pumps for process water and pumps capable of delivering water to the Upper AQC pond or to the power plant are used as primary control of reservoir levels in the Lower AQC pond.

The Upper AQC pond has a principal spillway that consists of an approximately 6 ft wide by 9 ft long by 22 ft high concrete riser fitted with stop logs (see Appendix A, Doc 12). As the solids and water level in the pond increased over time, stop logs were added or removed to manage water levels within the impoundment. The concrete riser is connected to an approximately 263-foot-long, 30-inch diameter corrugated metal pipe (CMP) that discharges into a basin at the toe of the embankment.

The basin discharges into the lower AQC pond. The plans show that three anti-seep collars are present along the alignment of the CMP. The collars are cast-in-place concrete and are shown to be 8 feet high by 12 feet wide and 9 to 11 inches thick.

The emergency spillway consists of a 50-foot-wide riprap lined channel over the embankment crest and the downstream slope. The opening for the spillway is shown to be 3 feet lower than the top of the embankment. The spillway design

includes a 4-ft deep, 1-ft wide seepage cut off wall constructed at the inside crest of the embankment. The emergency spillway does not discharge into the Lower AQC pond, but rather discharges into a drainage swale that slopes to the west.

2.5 CRITICAL INFRASTRUCTURE WITHIN FIVE MILES DOWN GRADIENT

KCP&L contracted with URS Corporation to evaluate of the potential impact of a breach or failure of the containment (Appendix A, Doc 5). All ponds are located adjacent to Lake La Cygne, which was constructed to provide water for the power plant. The surface area of the combined ponds is less than 500 acres and the total storage capacity slightly less than 5,500 acre feet.

Design plans for Lake La Cygne show the hydrological information for the dam. The drawing shows that, at the design storm (25.27 inches over 24 hours) the lake reaches a maximum elevation of 847.1 feet at the peak of the hydrograph. The stage-storage curve shows that the lake contains 60,000 acre-feet of water at this elevation. The top of dam elevation is 854 feet, so there is approximately 7 feet of freeboard when the lake is at its maximum elevation.

Since the ponds are in close proximity to the lake, a breach would release stored material into the lake causing a rise in the lake level. Of interest is the change in freeboard at the dam at the time of the breach. URS Reports have stated that the surface area of the lake at elevation 847.1 is 3,350 acres. A release of 5,500 acre feet from the ponds would raise the lake level approximately 1.62 feet. The freeboard at the dam at the time of the breach would remain greater than 5 feet.

A catastrophic failure of the system would be contained within Lake La Cygne, having no impact on other property owners.

3.0 SUMMARY OF RELEVANT REPORTS, PERMITS, AND INCIDENTS

3.1 SUMMARY OF REPORTS ON THE SAFETY OF THE MANAGEMENT UNIT

KCP&L provided numerous reports and documents documenting the La Cygne management units and the KCP&L safety and management practices. A brief listing is as follows:

1. AQC Pond Level.xls
2. Final Geotechnical Evaluation Report.pdf
3. Breach Impact Analysis Memo.pdf
4. Safe Water Level Study Report.pdf
5. KDHE 7-13-2010 Landfill Inspection.pdf
6. La Cygne Upper and Lower AQC Pond Inspection March 2009.pdf
7. La Cygne ACQ Pond Insp Jan 1986.pdf
8. 2010.08.10 La Cygne NPDES Inspection.PDF
9. Landfill emergency response plan LaCygne-10.pdf
10. Operating Procedure Water Quality Monitoring Program.pdf

From the review of the documentation provided, it would appear that KCP&L has a well documented and functional Safety of the Management Units program. In summary, the reports and other documentation concluded that the structures appeared to be performing adequately and that no conditions were observed that would adversely compromise the continued safe operation of the management units.

3.2 SUMMARY OF LOCAL, STATE, AND FEDERAL ENVIRONMENTAL PERMITS.

KCP&L provided numerous reports, documents and permits documenting the La Cygne Local, State, and Federal Environmental permits. A brief listing is as follows:

1. La Cygne NPDES Permit.pdf
2. 2004 March URS La Cygne Permit Consolidation Request.pdf
3. KDHE 7-13-2010 Landfill Inspection.pdf
4. 2010.08.10 La Cygne NPDES Inspection.PDF
5. Invoice KS Dept of Agriculture 20100226.pdf

The State of Kansas regulates the management units dually under the Kansas Department of Health And Environment: Division of Environment Waste Management Program and the Kansas Department Of Agriculture: Division of

Water Resources, Water Structures Program. Both current inspection reports indicated the facilities were compliant with their permits.

3.3 SUMMARY OF SPILL/RELEASE INCIDENTS

Data reviewed by Dewberry indicated the following spills or unpermitted releases from the dam:

- Early-mid July 2007 - AQC ponds flowed over an emergency spillway
  The LaCygne Generating Station and surrounding area experienced high rainfall for the months of June and July 2007. As a result, impounded water in the Air Quality Control (AQC) ponds flowed over an emergency spillway which was activated in order to protect the embankments and avoid a catastrophic failure of the ponds. The impoundments operated normally as no-discharge evaporative structures that do not have permitted discharge outfalls under the Station's 2004 NPDES permit (Kansas Permit Number I-MC18-P001; Federal Permit Number KS0080071). Water was released from the AQC ponds through the emergency spillway during early-mid July 2007. The anticipated discharge was reported to the Kansas Department of Health and Environment: Bureau of Water by telephone on July 2, 2007.

4.0 SUMMARY OF HISTORY OF CONSTRUCTION AND OPERATION

4.1 SUMMARY OF CONSTRUCTION HISTORY

4.1.1 Original Construction

Plans originally prepared by Ebasco Services, dated 02 October 1973, show that the lower pond is formed by an approximately 10,500-foot-long embankment. The plans do not provide details on the embankment materials; it is assumed that the embankment consists entirely of compacted native clay. No internal drainage for the embankment is shown. The embankment for the Lower AQC pond was constructed as part of the original power plant construction. It was built in accordance with engineering plans and specifications and its construction was overseen by an independent construction manager. The embankments were constructed on ground undisturbed by power plant operations. The plans detailed clearing and grubbing of the construction site, as well as the keying in of the embankment as it was compacted.

The Upper AQC pond is formed by an approximately 18,000-foot-long embankment. The Woodward Clyde Inc. design documents, dated 30 January 1979, show that a typical embankment section has an impervious upstream section and a random zone on the downstream slope. The upstream and downstream slopes are inclined at 2.5H to 1V. The width of the dam crest varies with the height of the embankment, ranging from 13 feet where the embankment is shortest to 18 feet where the embankment is tallest. The height of the embankment varies from approximately 15 feet along the northwest side to about 45 feet on the southeast side.

The embankment was designed and constructed with an internal drainage system to intercept seepage through the embankment. The drain was constructed of freely draining bottom ash with little fines and a gradation like a poorly graded medium to coarse sand. Internal drainage is provided along the entire length of the embankment. The drainage blanket material consists of coarse, pervious bottom ash generated at the station.

The Upper AQC pond was constructed from a signed and sealed set of construction drawings. The plans and specifications were submitted to the Kansas Division of Water Resources, State Board of Agriculture and were approved and stamped by Guy E. Gibson, P.E., the division’s chief engineer. The pond embankments were constructed on ground that had not been impacted by power plant construction or operation. Geologic and geotechnical conditions at the site were extensively

characterized. The plans detailed clearing and grubbing of the construction site, as well as the keying in of the embankment as it was compacted.

4.1.2 Significant Changes/Modifications in Design since Original Construction

The historical information provided by KCP&L and site observations indicate that embankments have not been altered since construction.

4.1.3 Significant Repairs/Rehabilitation since Original Construction

The historical information provided by KCP&L indicate that embankments have been stable since construction with no indications of cracking, bulging or other indications of instability that might jeopardize the integrity of the ponds.

Two separate shallow slides occurred on the downstream slope of the Upper AQC pond. The first slide occurred in 1987 and the second slide occurred in 1995. These slides were located approximately between Stations 50 and 58. On both occasions, the failure scarp was below the crest of the dam. Repairs implemented by KCP&L involved removal of the disturbed material.

4.2 SUMMARY OF OPERATIONAL PROCEDURES

4.2.1 Original Operational Procedures

AQC sludge from Unit 1 is piped directly to the Upper AQC pond where the solids settle out. The outfall locations are moved within the pond to direct sedimentation to the desired locations. The Upper AQC pond is permitted as a non-discharge pond.

KCPL irrigates the sludge deltas that have formed for the purpose of water evaporation. Water within the Upper AQC pond is pumped into a series of pipes equipped with spray bars that send the water out as a mist, thereby increasing evaporation. The irrigation system is operated seasonally, typically shutting down during the winter months due to icing. Evaporation rates have been increased by construction of internal dikes within the pond. These dikes form shallow flat deltas that increase shallow surface water areas, thereby increasing AQC pond evaporation. The internal dikes are constructed entirely of recycled waste.

The Lower AQC pond receives water from the Upper AQC pond. The Lower AQC pond water is used as make-up water for scrubber operation and is permitted as a non-discharge pond.

4.2.2 Significant Changes in Operational Procedures and Original Startup

The historical information provided by KCP&L and site observations indicate that there have not been significant changes in operational procedures from original startup.

4.2.3 Current Operational Procedures

In order to increase the operating life of the Upper AQC pond, solids deposited in the pond are excavated, stacked within the AQC pond to dry, then transported in trucks to the dry landfill. KCPL estimates that approximately 5,000-25,000 tons of solids per month are transported from the Upper AQC pond to the dry landfill. The Upper AQC pond receives water from the AQC sludge and from precipitation. Outflows include evaporation, water for the AQC pump seal, and planned discharges to the Lower AQC pond.

Following construction of the Upper and Lower ponds, KCP&L personnel performed periodic visual inspections of the embankments and their spillways. Historical observations on embankment performances were provided to URS for review. Additionally, URS has conducted annual groundwater monitoring at La Cygne since 2004 and has visited the site on many occasions since the facilities were constructed. Our previous observations include the crest of the embankment and toe of the downstream slope in the area of the existing monitoring wells.

4.2.4 Other Notable Events since Original Startup

The historical information provided by KCP&L and site observations indicate that have not been significant nor notable events since original startup.

5.0 FIELD OBSERVATIONS

5.1 PROJECT OVERVIEW AND SIGNIFICANT FINDINGS

Dewberry personnel Michael McLaren, P.E. and Andrew Cueto, P.E. performed a site visit on Tuesday, September 21, 2010 in company with the participants listed in Section 1.3.1.

The site visit began at 8:30 AM. The weather was warm and cloudy. Photographs were taken of conditions observed. Please refer to photographs in Appendix B and the Dam Inspection Checklist in Appendix C. Selected photographs are included here for ease of visual reference. All pictures were taken by Dewberry personnel during the site visit.

The overall assessment of the dam was that it was in satisfactory condition and no significant findings were noted.

5.2 EARTH EMBANKMENT 1

5.2.1 Crest

Upper AQC Pond

The crest of the dike had no signs of depressions, tension cracks, or other indications of settlement or shear failure, and appeared to be in satisfactory conditions. Figure 5.2.1-1 shows the conditions of the crest of southern dike of the Upper AQC Pond.

Figure 5.2.1-1

Figure 5.2.1-2 shows the conditions of the crest of eastern dike of the Upper AQC Pond.

Figure 5.2.1-2

Figure 5.2.1-3 shows the conditions of the crest of northern dike of the Upper AQC Pond.

Figure 5.2.1-3

Figure 5.2.1-4 shows the conditions of the crest of western dike of the Upper AQC Pond.

Figure 5.2.1-4

Lower AQC Pond

The crest of the dike had no signs of depressions, tension cracks, or other indications of settlement or shear failure, and appeared to be in satisfactory conditions. Figure 5.2.1-5 shows the conditions of the crest of southern dike of the Upper AQC Pond.

Figure 5.2.1-5

Figure 5.2.1-6 shows the conditions of the crest of western dike of the Upper AQC Pond.

Figure 5.2.1-6

5.2.2 Upstream/Inside Slope

Upper AQC Pond

The inside slope of the south dike had no observed scarps, sloughs, bulging, cracks, or depressions or other indications of slope instability or signs of erosion. Figure 5.2.2-1 shows the general condition of the inside slope of the south dike.

Figure 5.2.2-1

The inside slope of the eastern and northern dikes had no observed scarps, sloughs, bulging, cracks, or depressions or other indications of slope instability or signs of erosion. However, a large majority of the slope was obstructed due to heavy vegetative cover. The vegetative cover was intentionally placed by KCP&L personnel to increase the evapotranspiration rate within the pond.

Figure 5.2.2-2 shows the general condition of the inside slope of the east and north dikes.

Figure 5.2.2-2

The inside slope of the west dike had no observed scarps, sloughs, bulging, cracks, or depressions or other indications of slope instability or signs of erosion.

Figure 5.2.2-3 shows the general condition of the inside slope of the west dike.

Figure 5.2.2-3

5.2.3 Downstream/Outside Slope and Toe

Upper AQC Pond

The down-gradient slope of the Upper AQC Pond southern dike is vegetated with grass. No major scarps sloughs, bulging, cracks, depressions, or other indications of slope instability or signs of seepage were observed.

Figure 5.2.3-1 shows a representative section of the embankment.

Figure 5.2.3-1

The down-gradient slope of the Upper AQC Pond eastern dike is vegetated with grass. No major scarps sloughs, bulging, cracks, depressions, or other indications of slope instability or signs of seepage were observed.

Figure 5.2.3-2 shows a representative section of the embankment.

Figure 5.2.3-2

The down-gradient slope of the Upper AQC Pond northern dike is vegetated with grass. No major scarps sloughs, bulging, cracks, depressions, or other indications of slope instability or signs of seepage were observed. Figure 5.2.3-3 shows a representative section of the embankment.

Figure 5.2.3-3

The down-gradient slope of the Upper AQC Pond western dike is vegetated with grass. No major scarps sloughs, bulging, cracks, depressions, or other indications of slope instability or signs of seepage were observed. Figure 5.2.3-4 shows a representative section of the embankment.

Figure 5.2.3-4

Lower AQC Pond

The down-gradient slope of the Lower AQC Pond southern dike is vegetated with grass. No major scarps sloughs, bulging, cracks, depressions, or other indications of slope instability or signs of seepage were observed. Figure 5.2.3-5 shows a representative section of the embankment.

Figure 5.2.3-5

The down-gradient slope of the Lower AQC Pond western dike is vegetated with grass. No major scarps sloughs, bulging, cracks, depressions, or other indications of slope instability or signs of seepage were observed. Figure 5.2.3-6 shows a representative section of the embankment.

Figure 5.2.3-6

5.2.4 Abutments and Groin Areas

Neither erosion nor uncontrolled seepage was observed along groins or abutments. Groin slopes and abutments are protected with the same vegetative cover as the adjoining slopes. Figures 5.2.4-1 shows typical conditions observed at the northwestern abutment between the Upper and Lower AQC Ponds.

Figure 5.2.4-1

5.3 OUTLET STRUCTURES

5.3.1 Overflow Structure/ Emergency Spillway

The Upper AQC Pond overflow structure is located at the center of southern embankment. The spillway consists of a 50-ft wide riprap lined channel over the embankment crest and the downstream slope. The opening for the spillway is shown to be 3 feet lower than the top of the embankment. The spillway design includes a 4-ft deep, 1-ft wide seepage cut off wall constructed at the inside crest of the embankment. The overflow drains directly into the La Cygne Generating Station cooling water lake. The structure appears to not have been used in recent history. Figure 5.3.1-1 shows the primary spillway structure for the Upper AQC Pond.

Figure 5.3.1-1

The Lower AQC Pond overflow structure is located at the northern quarter of the western embankment. The spillway consists of an 8'x15' box reinforced concrete structure. The overflow drains directly into the La Cygne Generating Station cooling water lake. The structure appears to not have been used in recent history. However, some seepage was observed coming out of the box. Figure 5.3.1-2 shows the primary spillway structure for the Upper AQC Pond.

Figure 5.3.1-2

5.3.2 Outlet Conduit

Upper AQC Pond

The principal outlet for the Upper AQC Pond consists of an approximately 6 ft wide by 9 ft long by 22 ft high concrete riser fitted with stop logs (see Appendix C: POND DRAWINGS) As the solids and water level in the pond increased over time, stop logs were added or removed to manage water levels within the impoundment.

The concrete riser is connected to an approximately 263 ft long, 30-inch diameter corrugated metal pipe (CMP) that discharges into a basin at the toe of the embankment. The basin discharges into the lower AQC pond. The plans show that three anti-seep collars are present along the alignment of the CMP. The collars are cast-in-place concrete and are shown to be 8 ft high by 12 ft wide and 9 to 11 inches thick.

Figures 5.3.2-1 and 5.3.2-2 show the primary outlet structure for the Upper AQC Pond.

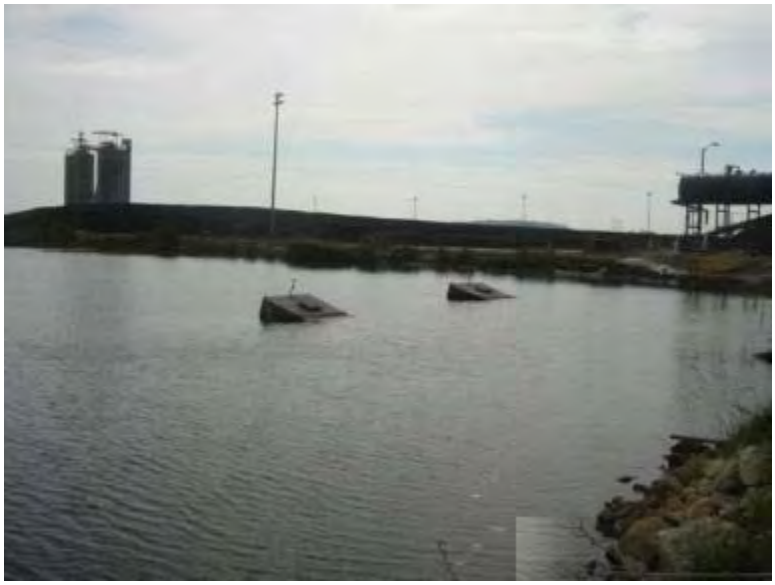
Figure 5.3.2-1

Figure 5.3.2-2

Lower AQC Pond

The principal outlet for the Lower AQC Pond consists an intake pump structure. The pumps transport process water and are capable of delivering water to the Upper AQC pond or to the power plant. They are the primary control of reservoir levels in the Lower AQC pond. Figure 5.3.2-3 shows the pump structure for the LowerAQC Pond.

Figure 5.3.2-2



6.0 HYDROLOGIC/HYDRAULIC SAFETY

6.1 SUPPORTING TECHNICAL DOCUMENTATION

6.1.1 Flood of Record/Safe Water Operating Level

KCP&L contracted with URS Corporation (URS) of Overland Park, KS to conduct a Safe Water Level Study of the Upper AQC Pond (Appendix A, Doc 9). URS analyzed the safe operating water levels within the Upper AQC Pond. The objective was to keep water levels at or below a safe level identified in the report to allow for the pond to store runoff and precipitation from the design storm and maintain a freeboard of one foot.

URS used the U.S. Army Corps of Engineers HEC-HMS computer software to calculate the peak discharges and total volume of captured stormwater for each basin. A 25-year, 24-hour design storm of 6.5 inches of total precipitation was used in the model. The U.S. Department of Agriculture's TR-55 was used in determining the precipitation amount for Linn County, Kansas. The study reported the following:

Total Site Storage Requirements	**124.35 ac-ft.**
From Stage Storage Table for Combined	**884.93 feet**
Recommended Safe Water Elevation	**884.5 feet**

6.1.2 Spillway Rating

The Lower AQC Pond spillway was designed with respect to EPA regulations at the time applicable to owners and operators of hazardous waste facilities (EPA, 1978). These proposed rules indicated that diversion structures should be capable of diverting the 25-year runoff away from the disposal site. Given these parameters the design capacity was approximately 785 cfs.

There were limited supporting documents to rate the Upper AQC Pond spillway. A Woodward Clyde Consultants letter to Kansas State Board of Agriculture Division of Water Resources dated 24January 1979, indicated the riprap on the face of the Emergency Spillway was designed to resist fluid velocity of 12 feet per second which corresponds to approximately the flow during the probable maximum flood from a 25-year, 24-hour design storm.

6.1.3 Downstream Flood Analysis

The Final Geotechnical Evaluation for the La Cygne Generating Station AQC Ponds dated September 2010 and prepared by URS Corporation contained a Breach Impact Analyses that reported information pertaining to a downstream flood analysis and impact. As stated by URS:

"Both AQC ponds are located uphill and adjacent to Lake La Cygne, so materials (water and solids) released from the ponds in the event of a breach or failure of the pond embankments would enter the lake. … Of interest is whether such a rapid release from the AQC ponds could cause Lake La Cygne dam to overtop.

The design drawings for Lake La Cygne were prepared by Black and Veatch and were provided to URS by KCP&L. The plans show that the lake discharges through an 88-foot-wide concrete ogee spillway with 2 radial gates that are 44 feet wide and 23 feet high. The crest and top of gate elevations are shown at 820.5 feet and 842 feet, respectively. … The hydrologic data sheet shows that the dam is designed to store runoff from a maximum precipitation event of 28.72 inches over a 24-hour period. The hydrographs … show that the lake level at the dam rises to a maximum of 847.1 feet during the design storm event. Top of dam elevation is 854 feet, so there would be approximately 7 feet of freeboard during the peak of the design storm.

A conservative estimate of the impact of breach or failure of the AQC ponds was made by assuming that the ponds failed during the peak of the hydrograph from the design storm event when the lake level at the dam would be 847.1 feet. The stage-storage curve included on the hydrologic data sheet shows the lake stores 60,000 acre-feet at elevation 847.1. It was also assumed that the entire volume contained within the ponds would be released into the lake. This is also a conservative assumption since the ponds are partially filled with solids and many of the solids would remain within the pond footprint."

Therefore, Dewberry was able to make the determination that if a catastrophic failure were to happen each AQC Pond would overflow into the La Cygne Generating Station cooling water lake. This structure has adequate capacity to absorb the release from a catastrophic failure.

6.2 ADEQUACY OF SUPPORTING TECHNICAL DOCUMENTATION

KCP&L provided numerous reports and documents documenting the La Cygne management units and the KCP&L Hydrologic/Hydraulic Safety.

A brief listing is as follows:

- AQC Pond Level
- Breach Impact Analysis Memo
- Final Geotechnical Evaluation Report
- Hydrologic Investigations for Coal Ash Scrubber
- Riprap Design and pH of Soils New FGD Sludge Retention Dam LaCygne
- Safe Water Level Study Report
- Slope Stability and Hydrologic Design Bases for New Fgd Sludge Retention Dam Lacygne
- URS Historic Information

The information provided was accurate, however, each pond was studied at different times in the past and analyzed as a separate system operating independently. There is no study of how the whole system would function and operate as currently configured.

6.3 ASSESSMENT OF HYDROLOGIC/HYDRAULIC SAFETY

Based on the calculations provided in the hydrologic and hydraulic study (See Appendix A, Docs 1, 3, 9, 10, and 12) the AQC Pond system can retain the probable maximum flood from a 25-year, 24-hour design storm event with a freeboard safety of at least 1.0 feet. Hence dike failure by overtopping seems unlikely.

7.0 STRUCTURAL STABILITY

7.1 SUPPORTING TECHNICAL DOCUMENTATION

7.1.1 Stability Analyses and Load Cases Analyzed

The 12 January 1979, Woodward Clyde Consultants' memorandum titled Slope Stability And Hydrologic Design Bases For New FGD Sludge Retention Dam La Cygne Station, Kansas, (See Appendix A, Doc 10) includes the original stability analysis for the Upper AQC Pond.

The stability analyses included the following results:

- Dam embankment was designed to have a minimum factor of safety for static slope stability of 1.5 which is consistent with the recommendations contained in the, "Engineering and Design Manual for Coal Refuse Disposal Facilities," published by the U. S. Department of Interior, Mining Enforcement and Safety Administration (HESA).
- Critical section for the slope stability analysis is a 40 ft high dam embankment section with 2' horizontal to 1' vertical side slopes and steady state seepage from a reservoir 5 feet below the crest to a 20-foot wide drain located inside the dam on natural ground.
- Using effective stress shear strength parameters for the embankment material of 20 degrees for the angle of internal friction and 2 psi for the cohesion, Woodward Clyde Consultants' computed a factor of safety in excess of 1.6.
- Earthquake stability for the dam was investigated by applying a pseudo static horizontal seismic acceleration to the embankment which is consistent with the location of the dam in Seismic Risk Zone I (Algermlssen. 1969).
- Computed factor of safety for the previous critical dam section subjected to seismic loading was in excess of 1.4 which is consistent with a recommended minimum factor of safety of 1.2 for seismic loading according to the MESA publication.

Based on the results of the analyses it was concluded that the embankments have stability safety factors at or above the minimum recommended values.

7.1.2 Design Parameters and Dam Materials

The September 2010, URS Corporation of Overland Park, Kansas study entitled, "Final Geotechnical Evaluation for the La Cygne Generating Station AQC Ponds," (See Appendix A, Doc 1) includes the analysis of the existing dam materials.

Lower AQC Pond

Generalized graphical logs of the exploratory borings drilled for the Lower AQC pond are shown in the Final Geotechnical Evaluation for the La Cygne Generating Station AQC Ponds - Figure 5, (See Appendix A, Doc 1). The design plans for the Lower AQC pond show a homogeneous embankment. Generally, native residual soils composed of stiff, high plastic clays are present beneath the embankment. The fill encountered in the borings for the Lower AQC pond consist primarily of stiff, high plastic clay with minor, small rock fragments. The range of properties measured on samples tested are listed below:

Dry Density	93.9 to 104.8 pcf
Natural Water Content	22.5 to 29.5 percent
Liquid Limit	61 to 75 percent
Plastic Limit	46 to 57 percent
Unconfined compressive Strength	4.5 to 4.8 kips per square foot (ksf)

UPPER AQC POND

Generalized graphical logs of the exploratory borings drilled for the Upper AQC pond investigation are shown in the Final Geotechnical Evaluation for the La Cygne Generating Station AQC Ponds - Figure 6, (See Appendix A, Doc 1). The typical subsurface profile at the boring locations consists of embankment fill, residual soil, weathered bedrock, and bedrock.

Embankment fill shown in the design plans for the Upper AQC pond indicate that the embankment is zoned. Impervious fill was placed in the upstream slope and random fill was placed in the downstream slope. Several exploratory borings

encountered the impervious fill and the test pits encountered the random fill. The impervious embankment fill zone materials at the boring locations consist primarily of high plastic clays with small, weathered shale fragments. The range of properties measured on samples tested is listed below:

Dry Density	93.5 to 113.6 pcf
Natural Water Content	15.2 to 28.4 %
Liquid Limit	47 to 71 %
Plastic Limit	14 to 23 %
Unconfined compressive Strength	2.7 to 9.7 ksf

7.1.3 Uplift and/or Phreatic Surface Assumptions

The Geotechnical Evaluation for the La Cygne Generating Station AQC Ponds (See Appendix A, Doc 1) states that the design plans for the lower pond show no internal drainage was installed; consequently, the theoretical phreatic surface exits on the downstream slope of the embankment above the toe of the slope. Water levels at piezometers installed were are at or below the contact between the embankment and original ground surface; thus, well below the theoretical phreatic surface. It is reported that these measurements are consistent with the dry conditions observed at the toe of the slope. Also, if the phreatic surface was present on the downstream slope, then softened, wetted soils and hydrophilic vegetation would be expected. None of these conditions were observed. No conditions indicative of seepage through the embankment were observed along the downstream slope.

Based on the URS field observations of the Upper AQC Pond, test data and observed water levels, seepage through the embankment is not a significant concern for the AQC pond. Continued monitoring of water levels in the piezometers and periodic inspection of the downstream slope was recommended to document continued performance of the internal drainage system.

7.1.4 Factors of Safety and Base Stresses

In the September 2010 Final Geotechnical Evaluation for the La Cygne Generating Station AQC Ponds (See Appendix A, Doc 1), stability analyses were conducted on four selected sections through the downstream slope of the Upper AQC pond and two sections through the Lower AQC pond. Excerpts from the report are as follows:

" *The embankments have been in service for approximately 30 years; drained shear strength properties of the embankment and foundation materials are appropriate for the analyses. The shear strength properties for the native soils and weathered bedrock were developed using the results of laboratory tests conducted on samples from the borings and Wright's1 published correlation between the fully-softened friction angle and liquid limit. The shear strength properties of the embankment soils were developed using the results of laboratory tests on embankment soils and embankment strengths developed by Duncan and Wright2. … The stability analyses assumed a fully developed theoretical phreatic surface within the embankment, a conservative assumption for observed current conditions since water levels are consistently below this theoretical level. The analyses were made using the UTEXAS3 software code.*

The design plans for the Lower AQC pond show a top of embankment elevation of 864 feet and a maximum ash disposal elevation of 860 feet. For the purpose of drawing the theoretical phrectic surface for slope stability, a water level of 862 feet was assumed. The design plans for the Upper AQC pond show a normal maximum reservoir level of 885.8 feet and a top of embankment elevation of 890 feet. The normal maximum reservoir level was used to develop the phrectic surface for the slope stability analyses."

The calculated safety factors ranged from 1.50 to 1.94. It should be noted that the United States Army Corps of Engineers Engineering Manual EM 1110-2-1902, Slope Stability, recommends a minimum safety factor of 1.5 for steady seepage conditions. The reported safety factors for each section location meet this recommended minimum value.

7.1.5 Liquefaction Potential

No documentation of soil liquefaction analyses was provided to Dewberry for review.

7.1.6 Critical Geological Conditions

Earthquake stability for the dam was investigated by applying a pseudo static horizontal seismic acceleration to the embankment which is consistent with the location of the dam in Seismic Risk Zone I (Algermlssen. 1969). Computed factor of safety for the previous critical dam section subjected to seismic loading was in excess of 1.4 which is consistent with a recommended minimum factor of safety of 1.2 for seismic loading according to the MESA publication.

7.2 ADEQUACY OF SUPPORTING TECHNICAL DOCUMENTATION

The technical documentation provided to Dewberry provided a complete historical and current perspective of the structural stability of the AQC Ponds. Although, it did lack several engineering analyses required to assess the structural stability with respect to Liquefaction Potential. If the original slope stability calculations cannot be located, new geotechnical engineering analyses should be conducted to verify that the existing slope stability with respect to Liquefaction Potential.

7.3 ASSESSMENT OF STRUCTURAL STABILITY

Overall, the structural stability of the dams appears to be **Satisfactory** based on the following observations:

- Dam embankments were designed to have a minimum factor of safety for static slope stability of 1.5 which is consistent with the recommendations contained in the, "Engineering and Design Manual for Coal Refuse Disposal Facilities," published by the U. S. Department of Interior, Mining Enforcement and Safety Administration (HESA).
- The recent Geotechnical Study indicates that the calculated safety factors ranged from 1.50 to 1.94. The United States Army Corps of Engineers Engineering Manual EM 1110-2-1902, Slope Stability, recommends a minimum safety factor of 1.5 for steady seepage conditions. The reported safety factors for each section location meet this recommended minimum value.

- Using effective stress shear strength parameters for the embankment material of 20 degrees for the angle of internal friction and 2 psi for the cohesion, Woodward Clyde Consultants' computed a factor of safety In excess of 1.6.
- Earthquake stability for the dam was investigated by applying a pseudo static horizontal seismic acceleration to the embankment which is consistent with the location of the dam in Seismic Risk Zone I (Algermlssen. 1969). The computed factor of safety for the previous critical dam section subjected to seismic loading was in excess of 1.4 which is consistent with a recommended minimum factor of safety of 1.2 for seismic loading according to the MESA publication.

8.0 ADEQUACY OF MAINTENANCE AND METHODS OF OPERATION

8.1 OPERATING PROCEDURES

From Appendix A, Doc 12, the Upper AQC pond was designed to act as a sedimentation basin which accepts and holds FGD sludge while maintaining a minimum amount of free surface water. FGD sludge consisting of water and suspended solids is introduced into the pond at the influent pipe location at a flow rate of approximately 5000 gpm. The natural slope of the reservoir bottom causes the sludge to circulate from the northeast quadrant to the southwest quadrant of the reservoir. Along this route, the suspended solid particles drop out of suspension. The effluent is then decanted from the reservoir through the service spillway into the Lower AQC pond which serves as a surge pond for the new reservoir. The service spillway structure controls the outflow of effluent from the Upper AQC.

During rainfall events the water surface in the Upper AQC pond is designed to rise, letting more water discharge through the service spillway. The Upper AQC pond has a surface area which is approximately two to four times larger than the Lower AQC pond. Precipitation from the design storm would raise the water level approximately 2 ft in the Upper AQC pond and 6 feet in the Lower AQC Ponds. Operating water level must be raised by periodically adding stop logs to maintain the controlled circulation rate of approximately 5,000 gpm.

During normal operation, a circulation rate of approximately 5,000 gpm produces a head of water flowing over the stop logs of approximately 7 inches. Substantial rainfall or an increase or decrease in pumping rate in the Lower AQC Pond proportionately changes the depth of water flowing over the stop logs. In general the surge pond level increases to within 4 to 5 ft of its maximum operating level under these conditions.

8.2 MAINTENANCE OF THE DAM AND PROJECT FACILITIES

The La Cygne Generating Station's AQC Pond system is designed and constructed to function safely as a water retaining structure (See Appendix A, Doc 12). A program of inspection and periodic maintenance was initiated to maintain the structural integrity of the earth embankment. It was stressed that a program of specific observations at regular intervals of time be established to identify problem areas which may develop. It was proposed that the inspection program described below be conducted by a KCP&L engineer at least once each year. In addition, special inspections should be made before, during, and after any planned or unplanned event that is outside the normal routine. Such events include earthquake

shocks of all intensities, unusual filling or rates of withdrawal of water, heavy rainstorms, including long duration or consistently frequent rains over an extended period of time, unseasonal storms or droughts, and whenever routine observations indicate a change in the trend of data or behavior pattern of the facility.

Special observations and investigations were to be made whenever unusual wet or green spots occur on the surface of the dam, cracks develop, unusual or differential settlement occurs, any signs of instability in the dam slopes or around the spillway, intake structure or outlet works, or any other change is noted. Observations made by the engineer during the inspection are systematically recorded including the date, time, location of the observation, description of what was observed, elevation of the reservoir water surface at the time of the observations, and a description of the weather. The recorded observations including photographs of typical areas of the dam together with photographs of potential problem areas are permanently filed.

Based on observations made during the site visit the crests of AQC Pond dikes were clear of vegetation. It is noted that the Upper AQC Pond had brushy vegetation, Saltceder: Tamarix Aphylla, purposely planted to enhance evapotranspiration. Other than the above noted, the dikes were generally free of trees and other large vegetation and appeared well maintained.

8.3 ASSESSMENT OF MAINTENANCE AND METHODS OF OPERATIONS

8.3.1 Adequacy of Operating Procedures

Based on the above assessments of this report, operating procedures appear to be adequate.

8.3.2 Adequacy of Maintenance

Although the current maintenance program appears to be adequate for the Ponds, several recommendations are provided to improve maintenance and ensure a trouble free operation:

- Develop a regular written documentation log of the operations, inspection and maintenance program;
- Clear woody vegetation from the interior dike slope in the Upper AQC Pond

Based on the assessments of this report, maintenance procedures appear to be adequate.

9.0 ADEQUACY OF SURVEILLANCE AND MONITORING PROGRAM

9.1 SURVEILLANCE PROCEDURES

The Stage 1 dam was instrumented with a series of eight settlement monuments along the dam crest (See Appendix A, Doc 12). These monuments consisted of a steel rod anchored in concrete at a depth of from about 4 to 5 ft below the downstream crest of the dam. The portion of the rod above the concrete anchor was isolated from the soil and protected by free-floating PVC tubing. The purpose of the monuments was to provide an initial simple form of control for the dam at its highest section. The top of this steel rod was surveyed to determine its initial elevation and x and y coordinates. These monuments provide a basis for verifying the operating performance.

Exploratory drilling and piezometer installation activities were conducted from June 29, 2010 to July 9, 2010 by O'Malley Drilling Company under the direction of URS personnel (See Appendix A, Doc 1).

9.2 INSTRUMENTATION MONITORING

The following systems and instrumentation are present and functioning at La Cygne Generating Station:

- eight settlement monuments along the dam crest (see Figure 9.2 -1)

Figure 9.2-1

- Eleven Piezometers (see Figure 9.2-2).

Figure 9.2-2

Although the systems, instrumentation and equipment are installed, there was not a set of regular monitoring procedures in place.

9.3 ASSESSMENT OF SURVEILLANCE AND MONITORING PROGRAM

9.3.1 Adequacy of Inspection Program

Based on the data reviewed by Dewberry, including observations during the site visit, the inspection program is adequate.

9.3.2 Adequacy of Instrumentation Monitoring Program

Although the current instrumentation systems installed appear to be adequate for the Ponds, it is recommended that KCP&L establish a regular monitoring and documentation program that logs and monitors changes in instrumentation readings on a recurring basis.

Based on the data reviewed by Dewberry, including observations during the site visit, the inspection program is adequate.

URS

September 17, 2010
URS Project 16530629

Mr. Mark Adams, P.E.
Kansas City Power & Light Company
One Kansas City Place
P. O. Box 418679
Kansas City, Missouri 64105

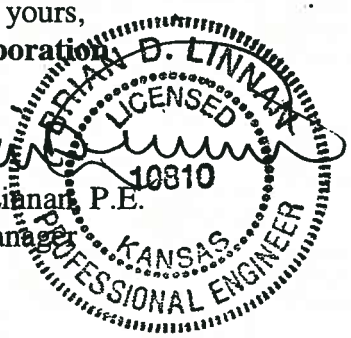
Re: Geotechnical Evaluation
AQC Ponds
La Cygne Generating Station

Dear Mr. Adams:

Transmitted with this letter is URS Corporation's report on our geotechnical evaluation of the AQC ponds at the referenced site. The scope of our evaluation included a breach analysis, seepage and slope stability analysis, settlement analysis, and installation of additional piezometers and settlement monitoring monuments.

We appreciate the opportunity to work with you on this project. If you have any questions concerning this report, please contact us.

Very truly yours,
URS Corporation



Brian D. Linnan, P.E.
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Wayne D. Smith, P.E.
Senior Geotechnical Engineer

Enclosure

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Overland Park, KS 66210
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GEOTECHNICAL EVALUATION

AQC PONDS – KANSAS CITY POWER & LIGHT

LA CYGNE GENERATING STATION LA CYGNE, KANSAS

Prepared for
Kansas City Power & Light Company
P. O. Box 418679
Kansas City, Missouri

September 2010

URS Corporation
8300 College Boulevard
Suite 200
Overland Park, Kansas 66210

Project No. 16530629

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Kansas City Power & Light's (KCP&L) La Cygne Generating Station has two impoundments containing waste materials from their air quality control systems at the station. These are referred to as air quality control (AQC) ponds, consisting of the Lower AQC pond and the Upper AQC pond. The pond locations are shown in Figure 1. The Lower AQC pond was constructed to receive flue gas desulphurization sludge sluiced from the power plant and was built as part of the original power plant construction. The design plans for this pond were prepared by Ebasco Services Incorporated and are dated in the early 1970s. Selected sheets showing design details are included in Attachment 1.

The Upper AQC pond was constructed in the late 1970s to provide additional storage for sluiced flue gas desulphurization sludge and is currently in service. The pond was designed by Woodward-Clyde Consultants (now URS); design plans are dated 1978. The original design plans for the pond are included in Attachment 2.

Currently, flue gas desulphurization sludge from the plant is sluiced to the Upper AQC pond. Overflow from the Upper AQC pond is directed to the Lower AQC pond through the upper pond's principal spillway. The ponds are managed as a non-discharge facility. Water levels are managed through enhanced evaporation and by drawing water from the Lower AQC pond for power plant operations.

Planned, future changes in power plant operations will eliminate the need to sluice flue gas desulphurization sludge to the existing AQC ponds; closure alternatives and schedules are under consideration by KCP&L for these existing AQC ponds. KCP&L contracted with URS to conduct a geotechnical evaluation of the existing AQC ponds to assess their performance and stability and to obtain data that will be useful in evaluating closure alternatives. The results of this evaluation are presented in this report.

Both the Upper and Lower AQC ponds are bounded by earth fill embankments which provide containment of the ash materials. The geotechnical evaluation included drilling exploratory borings, installing piezometers, conducting a video survey of the principal spillway conduit of the upper pond, and conducting laboratory tests on embankment and foundation soils. Additionally, J. D. Campbell, P.E., Ph.D., the engineer of record for the design and construction of the Upper AQC pond, provided technical assistance and served as an external peer reviewer of this report.

2.1 LOWER AQC POND

Plans prepared by Ebasco Services show that the lower pond is formed by an approximately 3,500-foot-long embankment. The plans do not provide details on the embankment materials, but given its limited height, we assume that the embankment is unzoned and consists entirely of compacted clay. No internal drainage is shown. An emergency overflow spillway is provided. Intake pumps for process water and pumps capable of delivering water to the Upper AQC pond or to the power plant are used as primary control of reservoir levels in the Lower AQC pond. The embankment for the Lower AQC pond was constructed as part of the original power plant construction. It was built in accordance with engineering plans and specifications and its construction was overseen by an independent construction manager. The embankments were constructed on ground undisturbed by power plant operations.

2.2 UPPER AQC POND

The Upper AQC pond is formed by an approximately 17,400-foot-long embankment. The design documents show that a typical embankment section has an impervious upstream section and a random zone on the downstream slope. The upstream and downstream slopes are inclined at 2.5H to 1V. The width of the dam crest varies with the height of the embankment, ranging from 13 feet where the embankment is shortest to 18 feet where the embankment is tallest. The height of the embankment varies from approximately 15 feet along the northwest side to about 45 feet on the southeast side.

The borrow materials for the embankment were obtained from within the reservoir. Borings drilled within the reservoir during the design investigation show that the general subsurface profile consisted of medium to high plastic residual clays over shale bedrock. The upper portion of the shale was weathered and plastic. With depth, the weathering decreased and the shale became harder and retained its laminated structure. The residual clays and weathered, plastic shale were excavated and used to construct the embankment. The embankment is zoned with an internal impervious zone, an external random zone, and a horizontal blanket drain near the downstream toe.

The embankment was designed and constructed with an internal drainage system to intercept seepage through the embankment. The drain was constructed of freely draining bottom ash with little fines and a gradation like a poorly graded medium to coarse sand. Internal drainage is provided along the entire length of the embankment (see Sheet 5, Attachment 2). Along the lower sections of the embankment, between stations 94+25 and about 174+00, the internal drainage system consists of a continuous 20- to 25-foot wide, 2-foot thick blanket drain that extends to the toe of the downstream slope. Along the higher portions of the embankment, a blanket drain begins approximately at the external limits of the base of the impervious zone; finger drains are provided to carry seepage to an outlet at the downstream embankment toe. The blanket drain from Station 0+00 to Station 94+25 is shown to be continuous along the length of the embankment and is approximately 15 to 20 feet wide and 3 feet thick. The finger drain outlets are 12 feet wide and 2 feet thick and are spaced on 200-foot centers. The drainage blanket material consists of coarse, pervious bottom ash generated at the station.

The principal spillway consists of an approximately 6 feet wide by 9 feet long by 22 feet high concrete riser fitted with stop logs (see Sheet 8, Attachment 2). As the solids and water level in the pond increased over time, stop logs were added or removed to manage water levels within the impoundment. The concrete riser is connected to an approximately 263-foot-long, 30-inch diameter corrugated metal pipe (CMP) that discharges into a basin at the toe of the embankment. The basin discharges into the lower AQC pond. The plans show that three anti-seep collars are present along the alignment of the CMP. The collars are cast-in-place concrete and are shown to be 8 feet high by 12 feet wide and 9 to 11 inches thick.

The emergency spillway consists of a 50-foot-wide riprap lined channel over the embankment crest and the downstream slope. The opening for the spillway is shown to be 3 feet lower than the top of the embankment. The spillway design includes a 4-foot-deep, 1-foot-wide, seepage cut off wall constructed at the inside crest of the embankment. The emergency spillway does not discharge into the Lower AQC pond, but rather discharges into a drainage swale that slopes to the west.

The Upper AQC pond was constructed from a signed and sealed set of construction drawings. The plans and specifications were submitted to the Kansas Division of Water Resources, State Board of Agriculture and were approved and stamped by Guy E. Gibson, P.E., the division's chief engineer. The pond embankments were constructed on ground that had not been impacted by power plant construction or operation. Geologic and geotechnical conditions at the site were extensively characterized. Over 100 exploratory borings or test pits were excavated and a thorough laboratory investigation was conducted to evaluate the properties of the soil and rock and in proposed embankment fills.

Woodward-Clyde Consultants provided construction management and quality assurance testing during construction of the Upper AQC pond under the direction of Dr. J.D. Campbell. The work included observation of stripping and other aspects of site preparation, observation and testing of the placement and compaction of the embankment fill, and observation of spillway construction.

2.3 HISTORIC PERFORMANCE

Following construction of the Upper and Lower ponds, KCP&L personnel performed periodic visual inspections of the embankments and their spillways. Historical observations on embankment performances were provided to URS for review. Additionally, URS has conducted annual groundwater monitoring at La Cygne since 2004 and has visited the site on many occasions since the facilities were constructed. Our previous observations include the crest of the embankment and toe of the downstream slope in the area of the existing monitoring wells.

The historical information provided by KCP&L and our past site observations indicate that embankments have been stable since construction with no indications of cracking, bulging or other indications of instability that might jeopardize the integrity of the ponds. Two separate shallow slides occurred on the downstream slope of the Upper AQC pond. The first slide occurred in 1987 and the second slide occurred in 1995. These slides were located approximately between Stations 50 and 58. On both occasions, the failure scarp was below the crest of the dam. Repairs implemented by KCP&L involved removal of the disturbed material

and replacement with select imported fill and revegetation. Historic and recent inspections of the repaired areas indicate that repairs were effective.

3.1 SITE RECONNAISSANCE

A site reconnaissance was conducted on June 16 and 17, 2010 by Brian Linnan (June 16 only), Francke Walberg and Wayne Smith. Ms. Tiffany Wheeler of KCP&L accompanied URS inspection personnel on June 16. Mr. Mark Adams of KCP&L met with URS inspection personnel on June 17 to discuss previous inspection observations and maintenance activities. The scope of activities associated with the site reconnaissance included the following:

- Review of geotechnical borings and laboratory test data compiled by Woodward-Clyde Consultants (URS predecessor firm) during design of the Upper AQC pond.
- Review of design drawings for the Upper AQC pond prepared by Woodward-Clyde Consultants.
- Review of previous inspection reports prepared by Kansas City Power & Light (KCP&L) staff.
- Review of 2009 water level data obtained during the November 2009 annual groundwater sampling event.
- On-site discussions with Mark Adams concerning historical observations during past inspections.
- On-site discussions with Mark Adams and Kissick Construction (Russell Mohr) concerning historical observations and previous maintenance/repair activities.
- Site observations of the condition of the crest and downstream slope of both ponds with emphasis on the western perimeter of both ponds where embankments heights are greatest.
- Site observations concerning potential signs of seepage along the exterior embankment slope and toe of both ponds.
- Site observations concerning the locations of existing observation wells and survey monuments associated with the original construction and previous maintenance/repair activities.
- Site observations concerning the condition of the principal and emergency spillway of the Upper AQC pond and the outlet structure of the Lower AQC pond.

The observed condition of the embankments which form the two ponds was consistent with the findings presented in previous KCP&L inspection reports. The embankments remain stable and generally exhibit only minor signs of seepage at the toe of the slope, where the internal drains of the Upper AQC pond discharge. The embankments are generally well maintained and the existing vegetative growth has been effective in limiting long term erosion. Specific items of interest noted during the site reconnaissance are identified below:

- Historic Shallow Slope Failures: As noted in Section 2.3, the historical information indicates that there have been two shallow slides along the exterior slope of Upper AQC pond within the general area noted on Figure 2. The first shallow slide occurred during 1987 and the second shallow slide occurred in 1995. Reconstruction of the shallow slide areas included overexcavation and replacement of the slide materials with controlled fills with benching into the existing embankment materials. The general area of the previous slide repairs was

observed during the 2010 site reconnaissance and no evidence of distress was noted. We were unable to discern the cause of the slides from our interviews with KCP&L and Kissick Construction, or the available records. It is Dr. Campbell's recollection that the sections of embankment between Stations 50 and 58 were some of the last sections constructed. Dr. Campbell also recalls that less plastic shale may have been placed in these sections of the embankment. It is possible that the sections of embankment completed last would have received a thicker topsoil cover, since there was an abundant supply available from stripping the embankment footprint and borrow areas. Although the cause of the slides is uncertain, the 14 plus years of good performance show that the repairs have been effective.

- Potential Seepage through the Upper AQC Embankment: The design and construction of the Upper AQC pond includes an internal drainage system to control seepage through the embankment and upper foundation. The internal drainage system includes a horizontal blanket drain extending to the toe along most of the eastern and southern perimeter of the embankment. The internal drainage system along the northern, western, and portions of the southern embankment includes an inner horizontal blanket drain with finger drains (spaced approximately 200 feet on-center) which daylight near the toe of the embankment. Site conditions during the reconnaissance were wet due to recent rainfall, but no signs of significant seepage through the embankment were noted. Several discrete areas of cattails and other changes in vegetation were observed which suggest localized seepage probably associated with the finger drains. Several large areas of cattails and marsh-like vegetation were also observed near the toe of the embankment. These areas appeared related to poor surface drainage rather than seepage through the embankment.
- Survey Monuments: There were eight settlement monuments (numbered SMC-1 through SMC-8) installed during the original construction activities for the Upper AQC pond. All eight monuments were identified during the site reconnaissance. The locations of these monuments are shown in Figure 3.
- Piezometers: Only one of the ten piezometers installed during the original Upper AQC pond construction activities (OW-5) was identified during the field reconnaissance. The location of OW-5 is shown in Figure 4.

3.2 EXPLORATORY DRILLING AND PIEZOMETER INSTALLATION

Eleven exploratory borings (P-501 through P-509 and P-601 through P-603) were advanced via 4.25-inch inner diameter (ID) Hollow Stem Augers (HSAs) from the crest of the embankments. The borings were extended through the embankment fills into the underlying bedrock foundation. Nine of the locations (P-501 through P-509) were drilled in the Upper AQC pond area and three of the locations (P-601 through P-603) were drilled in the Lower AQC pond area. The boring and piezometer locations are show on Figure 4. Each exploratory boring was sampled at five-foot-intervals with a California Sampler, Shelby Tube, or a split spoon sampler for geotechnical analysis, as well as descriptive logging. The exploratory boring logs are included in Appendix A.

Upon completion of the drilling and sampling, a piezometer was installed at each location. Piezometer installation reports are included in Appendix B. The exploratory drilling and

piezometer installation activities were conducted from June 29, 2010 to July 9, 2010 by O'Malley Drilling Company under the direction of URS personnel.

3.3 TEST PITS

Eleven test pits (TP-501SS, TP-501T, TP-502T, TP-503SS, TP-504SS, TP-504T, TP-505SS, TP-505T, TP-506T, TP-507, TP-508T) were excavated in the Upper AQC pond area. The test pits with a "SS" designation were excavated in to the side slope of the embankment to observe and sample material in the random zone of the embankment. The test pits with a "T" designation were excavated into the toe of the embankment for the same purpose and to observe and sample the material associated with the internal drains. The locations of the test pits are shown on Figure 4. The test pits were excavated from July 14, 2010 through July 15, 2010 by Kissick Construction Company and were observed and documented by URS personnel.

Granular drainage material associated with the internal drainage system of the Upper pond was encountered in four of the test pits (TP-502T, TP-505T, TP-506T, and TP-507). The granular material is composed of black bottom ash. Water was observed flowing from the drainage material at each location it was encountered.

3.4 SETTLEMENT MONUMENTS

Nine new settlement monuments (SMC-9 through SMC-17) were installed at the site. The settlement monuments were constructed by drilling a boring to approximately three feet below ground surface with a 12-inch diameter auger. The bore hole was filled with concrete and a ½-inch diameter piece of steel rebar placed in the center. The rebar was cut so that approximately 2 inches is exposed above the top of the concrete. Six of the new settlement monuments (SMC-9 through SMC-14) were installed in the Upper AQC pond area and three of the new settlement monuments (SMC-15 through SMC-17) were installed in the Lower AQC pond area. The locations of the settlement monuments are shown on Figure 3. The settlement monuments were drilled and constructed from July 16, 2010 through July 20, 2010 by Kissick Construction Company.

3.5 SURVEYING

A horizontal and vertical survey of the existing and newly installed settlement monuments was performed at the site. In addition, ground surface elevations were measured at the test pit and piezometer locations and top of casing elevations were measured at the piezometers. The surveying was performed by Taliaferro and Browne, Inc., between July 19 and 22, 2010. The locations and elevations of the surveyed points are shown in Drawing 1.

3.6 VIDEO SURVEY

Ace Pipe, Inc., under subcontract to URS, conducted a video survey of the 30-inch diameter CMP principal spillway outlet associated with the Upper AQC pond. The video survey was conducted due to the age of the pipe, its importance to the structure's integrity and function, and because no record of assessments of the pipe since its installation were available. The video survey was conducted on August 20, 2010. The video survey indicated partial removal of a thin

coating on the interior of the pipe attributable to water flowing through the pipe; however, it did not indicated areas of significant corrosion or defects in the pipe. A CD of the video survey is included as Attachment 3.

3.7 WATER LEVEL MEASUREMENTS

Water levels in the piezometers and nearby groundwater monitoring wells were measured using an electronic water level indicator on July 20, 2010. Water levels in the piezometers were measured again on August 20, 2010. The measurements are listed in Table 1.

All soil and bedrock samples collected in the exploratory borings and test pits were returned to the URS Overland Park, Kansas geotechnical testing laboratory for further visual examination. Selected samples were tested for water content, density, Atterberg Limits, unconfined compressive strength, and grain size. Data plots and a summary of the test results are included in Appendix C.

5.1 LOWER AQC POND

Generalized graphical logs of the exploratory borings drilled for the Lower AQC pond are shown in Figure 5. The design plans for the Lower AQC pond show a homogeneous embankment. The fill encountered in the borings for the Lower AQC pond consist primarily of stiff, high plastic clay with minor, small rock fragments. The range of properties measured on samples tested are listed below:

Dry Density	-	93.9 to 104.8 pcf
Natural Water Content	-	22.5 to 29.5 percent
Liquid Limit	-	61 to 75 percent
Plastic Limit	-	46 to 57 percent
Unconfined compressive Strength	-	4.5 to 4.8 kips per square foot (ksf)

Native residual soils composed of stiff, high plastic clays are present beneath the embankment at Borings P-601 and P-602. The liquid and plastic limits measured on a sample of the residual soil were 66 and 18 percent, respectively. An unconfined compressive strength of 2.2 kips per square foot was measured on the one sample tested. Boring P-602 terminated in residual clay at a depth of approximately 29 feet below ground surface.

Weathered shale was present beneath the residual clay in Boring P-601. The shale was encountered at a depth of 21.5 feet (elev. 841.9 ft.) and continued to the bottom of this 24.5-foot-deep boring.

5.2 UPPER AQC POND

Generalized graphical logs of the exploratory borings drilled for the Upper AQC pond investigation are shown on Figure 6. The typical subsurface profile at the boring locations consists of embankment fill, residual soil, weathered bedrock, and bedrock. The following sections summarize the properties of the subsurface materials encountered.

Embankment Fill – Sheet 7 of the design plans for the Upper AQC pond show that the embankment is zoned. Impervious fill was placed in the upstream slope and random fill was placed in the downstream slope. The exploratory borings P-501 through P-509 encountered the impervious fill and the test pits encountered the random fill.

The impervious embankment fill zone materials at the boring locations consist primarily of high plastic clays with small, weathered shale fragments. The range of properties measured on samples tested is listed below:

Dry Density	-	93.5 to 113.6 pcf
Natural Water Content	-	15.2 to 28.4 percent
Liquid Limit	-	47 to 71 percent
Plastic Limit	-	14 to 23 percent
Unconfined compressive Strength	-	2.7 to 9.7 ksf

Visual examination of the soil samples collected from the embankment and the water contents and densities measured are consistent with good compaction and high shear strength.

The random fill along the downstream slope of the embankment was sampled at the test pit locations. The material at the test pit locations consists of topsoil composed primarily of dark brown, high plastic clay with organics over high plastic clay with small shale and rock fragments. The thickness of the topsoil at the test pit locations ranged between 0.5 and 3 feet and was greater than 1.5 feet at 8 of the 11 test pit locations. The random fill appeared to be well compacted. Lifts were not discernable and no desiccation cracks or voids in the fill were observed. Measured water contents ranged between 10.9 and 28.7 percent. All but one of the seven samples tested had water contents of 24.6 percent or higher. Measured liquid limits ranged between 52 and 75 and measured plasticity indexes range between 32 and 54.

Gradation tests were conducted on samples of the embankment drain material collected at Test Pits TP-506T and TP-507. Gradation curves are included in Appendix C and show that the drain material classifies as poorly graded sand (SP) or poorly graded sand with silt (SP-SM) based on the Unified Soil Classification system. The percentage of fines, defined as amount of material passing the No. 200 sieve, ranged from 1.7 percent in the sample from TP-507 to 5.8 percent from the sample from TP-506T.

6.1 LOWER AQC POND

Figure 7 shows cross-sections through the exploratory borings drilled on the crest of the Lower AQC pond, water levels in the piezometers, the theoretical phreatic surface, and water levels measured in nearby groundwater monitoring wells. The design plans for the lower pond show that no internal drainage was installed; consequently, the theoretical phreatic surface exits on the downstream slope of the embankment above the toe of the slope. Water levels at Piezometers P-601 and P-602 are at or below the contact between the embankment and original ground surface; thus, well below the theoretical phreatic surface. These measurements are consistent with the dry conditions observations at the toe of the slope. If the phreatic surface was present on the downstream slope, then softened, wetted soils and hydrophilic vegetation would be expected. None of these conditions were observed.

A high water level does exist within the embankment at P-601. We believe this to be an anomalous condition caused by leakage adjacent to the pipes that feed the pump station near P-601. No conditions indicative of seepage through the embankment were observed along the downstream slope.

Based on our field observations and observed water levels, seepage through the embankment is not a significant concern for the Lower AQC pond embankment. However, continued monitoring of water levels in the piezometer and periodic visual inspection of the downstream embankment slope are recommended to confirm our assessment, particularly the anomalous condition identified at P-601.

6.2 UPPER AQC POND

The Upper AQC pond was constructed with a continuous internal drainage system. Refer to Sheets 5 and 7 of the Woodward-Clyde design (Attachment 2) for details on the drainage system.

Figures 8 through 11 show cross-sections of the Upper AQC pond embankment at the locations where the new piezometers, P-501 through P-509, were installed. Also shown on these cross-sections are the water levels in the piezometers and water levels interpolated from the groundwater monitoring wells adjacent to the pond. It is important to note that the piezometers and groundwater monitoring wells are measuring piezometric levels in different formations. The recently completed piezometers are screened in the embankment fill and/or the underlying residual soil and weathered shale. The groundwater monitoring wells are screened in the unweathered bedrock. Thus, water levels in the piezometers measure the influence of the water contained in the impondment and water levels in the groundwater monitoring wells are controlled by regional groundwater flow.

Soil mechanics literature contains equations and graphical methods to show the theoretical long-term, steady state phreatic surface within an embankment retaining water. The theatrical surfaces are included in Figures 8 through 11. A comparison between the measured water levels in the piezometers and the theoretical phreatic surface shows that, at all measured locations, the measured water levels in the embankment are below the theoretical phreatic surface. We postulate that the infiltration through the embankment is slow and limited and that the internal drainage system is functioning as intended.

The gradation of the bottom ash from the samples tested was compared to the criteria for filters published in United States Army Corps of Engineers Engineering Manual EM-1110-2-2300, General Design and Construction Considerations for Earth and Rick-Fill Dams. The gradation of the bottom ash samples tested met the permeability criteria but did not meet the filter criteria. Filtering prevents movement of finer soil particles from the embankment into and through the filter. While the existing drainage material does not meet the filter criteria, gradation tests on the bottom ash showed less than six percent fines. If movement of embankment fines was significant, we would expect that the fines content of the drainage material would be much higher than shown by the test results. Additionally, the plasticity and density of the impervious fill indicate low permeabilities which foster little or no migration of fines.

Based on our field observations, test data and observed water levels, seepage through the embankment is not a significant concern for the Upper AQC pond. Continued monitoring of water levels in the piezometers and periodic inspection of the downstream slope is recommended to document continued performance of the internal drainage system.

Stability analyses were conducted on four selected sections through the downstream slope of the Upper AQC pond and two sections through the Lower AQC pond. The locations of the sections analyzed and the rationale for their selection are listed below:

Location	Rationale for Selection
Piezometer P-502	Highest embankment section with blanket drain
Piezometer P-506	Highest section with toe drain
Piezometer P-507	Artesian condition in bedrock
Piezometer P-508	Representative of lower embankment heights along east side of pond
Piezometer P-601	Typical section of Lower AQC pond with measured, low water levels
Piezometer P-603	Measured high water level in Lower AQC embankment

The embankments have been in service for approximately 30 years; drained shear strength properties of the embankment and foundation materials are appropriate for the analyses. The shear strength properties for the native soils and weathered bedrock were developed using the results of laboratory tests conducted on samples from the borings and Wright's[1] published correlation between the fully-softened friction angle and liquid limit. The shear strength properties of the embankment soils were developed using the results of laboratory tests on embankment soils and embankment strengths developed by Duncan and Wright[2]. The shear strength envelope used for the embankment soils is illustrated in Figure 12.

The stability analyses assumed a fully developed theoretical phreatic surface within the embankment, a conservative assumption for observed current conditions since water levels are consistently below this theoretical level. The analyses were made using the UTEXAS3 software code.

The design plans for the Lower AQC pond show a top of embankment elevation of 864 feet and a maximum ash disposal elevation of 860 feet. For the purpose of drawing the theoretical phrectic surface for slope stability, a water level of 862 feet was assumed. The design plans for the Upper AQC pond show a normal maximum reservoir level of 885.8 feet and a top of embankment elevation of 890 feet. The normal maximum reservoir level was used to develop the phrectic surface for the slope stability analyses.

Calculated safety factors are listed in the following table. Graphical output from the stability program showing the embankment and foundation geometry, soil properties, piezometric levels, the critical slop surface, and calculated safety factors are included in Appendix D. Output from the stability program is also included in Appendix D.

[1] Wright, S.G. Evaluation of Soil Shear Strengths for Slope and Retaining Wall Stability Analyses with Emphasis on High Plasticity Clays, Report No. FHWA/TX-06/5-1874-01-1, 2005.

[2] Duncan, M.J. and Wright, S.G. Soil Strength and Slope Stability, John Wiley & Sons, Inc. 2005.

Summary of Computed Safety Factors - Downstream Embankment Slopes
La Cygne AQC Ponds

Section Location	Computed Safety Factor - Steady State Seepage Condition
P-502	1.52
P-506	1.50
P-507	1.58
P-508	1.60
P-601	1.94
P-603	1.55

The United States Army Corps of Engineers Engineering Manual EM 1110-2-1902, Slope Stability, recommends a minimum safety factor of 1.5 for steady seepage conditions. The computed safety factors for each section location meet this recommended minimum value.

Embankments constructed from high plastic clays can experience 'wet weather' slumps, and can be prone to slides if wet weather conditions develop after a prolonged period of dry weather when deep desiccation cracks may develop on the downstream slope. Strength reduction through wetting/drying related strains combined with water filled desiccation cracks may contribute to conditions where slides can occur. These slides are typically shallow and would not be expected to impact the stability of the embankment so long as repairs are made within a reasonable period.

The embankment materials and conditions at the time of the 1987 and 1995 shallow surface slides on the downstream slope of the Upper AQC pond are not sufficiently documented to explain the causes(s) of slope failure. The slides were shallow so they may have occurred as wet weather slumps due to the mechanism described above or they could have occurred due to a thickened topsoil covering and/or inadequate bonding between the topsoil and underlying embankment. Since these are the only slides that occurred over the past 30+ years and the repaired areas have been stable for over 15+ years, it is unlikely that shallow wet weather slides will develop in the future. We note that the test pits typically encountered 1 to 3 feet of topsoil on the downstream slopes. This thickness of topsoil may be effective in controlling desiccation cracks within the underlying plastic embankment fill.

Figure 3 shows the locations of the eight settlement monitoring monuments, SMC-1 through SMC-8 that were installed in 1980 at the time embankment construction was completed. Each of these monuments was found to be in place during the June 2010 site reconnaissance. The elevation of the monuments were measured in July 2010 by surveyors from Taliaferro and Browne. The original and July 2010 elevations at the monuments are listed below:

Measured Vertical Movements
at Original Settlement Monitoring Locations
Upper AQC Pond

Location	Reported As-Installed Monument Elev. (ft)	July 2010 Monument (ft))	Difference (ft)
SMC-1	890.67	889.63	-1.04
SMC-2	890.76	890.57	-0.19
SMC-3	891.11	891.08	-0.03
SMC-4	890.67	890.66	-0.01
SMC-5	890.86	890.91	+0.05
SMC-6	890.99	891.11	+0.12
SMC-7	891.49	890.46	-0.03
SMC-8	890.63	890.54	-0.09

Note: Negative numbers indicate settlement

A comparison between the original and July 2010 elevations shows that the embankment has settled less than 0.2 feet (approximately 2.5 inches) in 30 years at seven of the eight monuments. The settlement data at SMC-1 is attributed to damage of the monument.

The embankment is supported on stiff, over-consolidated residual clays and bedrock. Given these foundation conditions, most of the settlement would be expected to occur as the embankments were constructed; post-construction settlement would be small since the loads imposed are less than the pre-consolidation stress in the foundation materials. The measured performance of the embankment and nature of the embankment and foundation materials indicate that future embankment settlement will be negligible.

Both AQC ponds are located uphill and adjacent to Lake La Cygne, so materials (water and solids) released from the ponds in the event of a breach or failure of the pond embankments would enter the lake. The positions of the AQC pond and Lake La Cygne are shown in the figure included in Appendix E. Of interest is whether such a rapid release from the AQC ponds could cause Lake La Cygne dam to overtop.

The design drawings for Lake La Cygne were prepared by Black and Veatch and were provided to URS by KCP&L. The plans show that the lake discharges through an 88-foot-wide concrete ogee spillway with 2 radial gates that are 44 feet wide and 23 feet high. The crest and top of gate elevations are shown at 820.5 feet and 842 feet, respectively. Hydrologic data used for design of the dam are shown on Sheet D-202 of the design plans; this sheet is included in Appendix E.

The hydrologic data sheet shows that the dam is designed to store runoff from a maximum precipitation event of 28.72 inches over a 24-hour period. The hydrographs included on Sheet D-202 shows that the lake level at the dam rises to a maximum of 847.1 feet during the design storm event. Top of dam elevation is 854 feet, so there would be approximately 7 feet of freeboard during the peak of the design storm.

A conservative estimate of the impact of breach or failure of the AQC ponds was made by assuming that the ponds failed during the peak of the hydrograph from the design storm event when the lake level at the dam would be 847.1 feet. The stage-storage curve included on the hydrologic data sheet shows the lake stores 60,000 acre-feet at elevation 847.1. It was also assumed that the entire volume contained within the ponds would be released into the lake. This is also a conservative assumption since the ponds are partially filled with solids and many of the solids would remain within the pond footprint.

The table below shows the estimated volumes within the ponds, the calculated rise in lake level, and remaining freeboard.

Case	Estimated Volume Released (acre-ft)	Calculated Instantaneous Rise in Lake La Cygne Level		Top of Dam Elev.	Freeboard (ft)
		Feet	Lake Elev.		
Upper AQC Pond Breach	8,325	2.49	849.59	854	4.41
Lower AQC Pond Breach	2,294	0.68	847.8	854	6.22
Simultaneous Breach of Both Ponds	10,619	3.17	850.27	854	3.73

The calculations show that under worse case conditions, the freeboard on the dam be approximately 3.7 feet or greater; thus, the dam would not be overtopped.

We present the following conclusions based on the results of our investigation, analyses and experience with similar projects.

1. The embankments for the Upper and Lower AQC ponds are composed primarily of stiff, high plastic clays with small pieces of shale. Measured water contents and densities and visual examination of recovered samples and test pits are consistent with placement of fill in thin, well compacted lifts. The underlying foundation materials are stiff, overconsolidated, high plastic residual soils and bedrock.

2. Measurements of settlement monuments on the Upper AQC pond show that settlement since end of construction in 1980 is less than 2.5 inches. Additional settlement of the embankments is expected to be negligible. No measurements of settlement of the Lower AQC pond embankments are available, but these embankments are short compared to those for the Upper AQC pond. The embankments for the Lower AQC pond are also founded on stiff, overconsolidated soils and bedrock. Consequently, we expect that future settlement of the embankment for the Lower AQC pond will also be negligible.

3. The design of the Upper AQC pond included internal drains to control seepage. Test pits excavated for this investigation encountered the drains at the positions shown on the design drawings. Water was observed in the drains at each location where the drains were encountered. Comparisons between the water levels in the embankment measured in the newly installed piezometers and the theoretical phreatic surface consistently show water levels below the theoretical phreatic surface. We conclude that the internal drainage system is functioning as intended and is effectively controlling seepage.

   Design of the Lower AQC pond embankments did not include internal drainage. Measured water levels in the newly installed piezometers are at or below the contact between the embankment and original ground surface at two of the three piezometer locations. High water levels at P-603 appear to be attributable to seepage along intake pipes that penetrate the embankment near this location. Since the depth of water in the Lower AQC pond is small and the embankment consists of well compacted, high plastic clays, the potential for seepage through the embankment is limited. Consequently, it is unlikely that the embankments will be negatively impacted by seepage.

4. Our site reconnaissance of the embankments for both AQC ponds observed no indications of slope instability. Calculated slope stability safety factors for current conditions exceed 1.5, the minimum safety factor for steady seepage conditions recommended for dams by the United States Army Corps of Engineers.

   Embankments constructed of high plastic clays can experience shallow, wet weather slumps. Best available information suggests that the embankments for the upper and lower ponds have not experienced such slides, perhaps due to the topsoil covering which may be controlling desiccation cracks. The shallow slides in 1987 and 1995 appear to be attributable to other causes. There have been no other slides since the 1987 and 1995 slides were repaired.

5. A conservative analyses shows that a release of the entire volume of solids and water stored in the Upper and Lower AQC ponds would raise the water level in Lake La Cygne approximately 3.2 feet. Assuming the release occurred when the lake was as its maximum operating level, the remaining freeboard would be approximately 3.7 feet. The failure of the AQC ponds would not raise the lake water level enough to overtop Lake La Cygne dam.

6. The embankments for the Upper and Lower AQC ponds have performed well over their 30+ years of service. The conditions encountered by this investigation and our analyses indicate continued favorable performance may be expected over the long-term.

The conclusions and recommendations presented in this report are based on the assumption that significant variations in soil properties from those encountered by our investigation do not occur. Borings have been placed at planned, selected locations, but some variation in soil properties between the borings probably exists. If conditions are notably different from those described here are discovered, we should be immediately notified.

The conclusions and recommendations given in this report are based on our analysis of the data collected for this project. Additive conclusions or recommendations made from these data by others are their responsibility. Our assessment is based on observations of current conditions, We note that planned, periodic visual inspections of the dams are important to identify any changes from present conditions that may require data maintenance.

Our services were provided in a manner consistent with the level of care and skill ordinarily exercised by other professional consultants under similar circumstances. No other representation is intended.

May 15, 2009

Via Express Mail

Mr. Richard Kinch
US Environmental Protection Agency
Two Potomac Yard
2733 S. Crystal Dr.
5th Floor; N-5738
Arlington, VA 22202-2733

Re: Request for Information Under Section 104(e) of the Comprehensive Environmental Response, Compensation, and Liability Act, 42 U.S.C. 9604(e)

Dear Mr. Kinch:

Enclosed is the response of Kansas City Power & Light Company (KCP&L) to EPA's Section 104 (e) request for information that was received May 4, 2009 regarding a bottom ash settling pond and scrubber sludge pond at KCP&L's La Cygne Generating Station. The bottom ash settling pond is for settling and not disposal. The bottom ash is removed from the bottom ash settling pond and beneficially used off-site. The scrubber sludge pond is part of the permitted landfill.

I certify that the information contained in this response to EPA's request for information and the accompanying documents is true, accurate, and complete. As to the identified portions of this response for which I cannot personally verify their accuracy, I certify under penalty of law that this response and all attachments were prepared in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fines and imprisonment for knowing violations.

If you have any questions regarding this response, please contact me at 913-757-4451.

Sincerely,

Bill Radford

Bill Radford
Plant Manager
La Cygne Generating Station

Enclosure A

Enclosure A

Kansas City Power & Light Company **May 15, 2009**
La Cygne Generating Station
Management Unit: Bottom Ash Settling Pond

Please provide the information requested below for each surface impoundment or similar diked or bermed management unit(s) or management units designated as landfills which receive liquid-borne material for the storage or disposal of residuals or by-products from the combustion of coal, including, but not limited to, fly ash, bottom ash, boiler slag, or flue gas emission control residuals. This includes units that no longer receive coal combustion residues or by-products, but still contain free liquids.

1. Relative to the National Inventory of Dams criteria for High, Significant, Low, or Less-than-Low, please provide the potential hazard rating for each management unit and indicate who established the rating, what the basis of the rating is, and what federal or state agency regulates the unit(s). If the unit(s) does not have a rating, please note that fact.

The Management Unit does not have a known rating. The Kansas Department of Health and Environment regulates solid waste facilities in Kansas.

2. What year was each management unit commissioned and expanded?

The Management Unit was commissioned approximately in 1977 and has not been expanded. Bottom ash is removed from the Management Unit and beneficially used or deposited into an on-site permitted landfill.

3. What materials are temporarily or permanently contained in the unit? Use the following categories to respond to this question: (1) fly ash; (2) bottom ash: (3) boiler slag; (4) flue gas emission control residuals; (5) other. If the management unit contains more than one type of material, please identify all that apply. Also, if you identify "other," please specify the other types of materials that are temporarily or permanently contained in the unit(s).

Bottom Ash.

4. Was the management unit(s) designed by a Professional Engineer? Is or was the construction of the waste management unit(s) under the supervision of a Professional Engineer? Is inspection and monitoring of the safety of the waste management unit(s) under the supervision of a Professional Engineer?

The Management Unit was not designed by a known Professional Engineer nor was the construction of the Management Unit under the supervision of a known Professional Engineer. Inspection and monitoring of the safety of the Management Unit is not completed under the supervision of a Professional Engineer.

5. When did the company last assess or evaluate the safety (i.e., structural integrity) of the

management unit(s)? Briefly describe the credentials of those conducting the structural integrity assessments/evaluations. Identify actions taken or planned by facility personnel as a result of these assessments or evaluations. If corrective actions were taken, briefly describe the credentials of those performing the corrective actions, whether they were company employees or contractors. If the company plans an assessment or evaluation in the future, when is it expected to occur?

The Management Unit is visually inspected on approximately a weekly basis by operational or security personnel. There has been no known assessment or evaluation of the safety (i.e., structural integrity) of the Management Unit beyond the visual inspection. There have been no known actions taken or planned by facility personnel as a result of the visual inspections of the Management Unit. There are no planned assessments or evaluation of this Management Unit in the future beyond the visual inspections.

6. When did a State or a Federal regulatory official last inspect or evaluate the safety (structural integrity) of the management unit(s)? If you are aware of a planned state or federal inspection or evaluation in the future, when is it expected to occur? Please identify the Federal or State regulatory agency or department which conducted or is planning the inspection or evaluation. Please provide a copy of the most recent official inspection report or evaluation.

There have been no known State or Federal regulatory official inspection or evaluation of the safety (structural integrity) the Management Unit. We are not aware of a planned state or federal inspection or evaluation in the future.

7. Have assessments or evaluations, or inspections conducted by State or Federal regulatory officials conducted within the past year uncovered a safety issue(s) with the management unit(s), and, if so, describe the actions that have been or are being taken to deal with the issue or issues. Please provide any documentation that you have for these actions.

There have been no known assessments or evaluations, or inspections conducted by State or Federal regulatory officials conducted within the past year that uncovered a safety issue(s) with the Management Unit.

8. What is the surface area (acres) and total storage capacity of each of the management units? What is the volume of material currently stored in each of the management unit(s)? Please provide the date that the volume measurement(s) was taken. Please provide the maximum height of the management units(s). The basis for determining the maximum height is explained later in this Enclosure.

The Management Unit's surface area is approximately 1.7 acres and the total storage capacity is approximately 19,000 cubic yards. The capacity measurements were made as of 2009. The volume of material currently stored in the Management Unit is estimated today to be approximately 1,500 cubic yards; although the bottom ash is removed approximately every two weeks. The Management Unit's Dam Height, pursuant to Enclosure A, is approximately 12 feet.

9. Please provide a brief history of known spills or unpermitted releases from the unit within the last ten years, whether or not these were reported to State or federal regulatory agencies. For purposes of this question, please include only releases to surface water or to the land (do not include releases to groundwater).

There have been no known spills or unpermitted releases from the Management Unit within the last ten years.

10. Please identify all current legal owner(s) and operator(s) at the facility.

The current legal owners of Iatan Generating Station are Kansas City Power & Light Company and Kansas Gas and Electric Company. The current operator of the LaCygne Generating Station is Kansas City Power & Light Company.

Enclosure A

Kansas City Power & Light Company **May 15, 2009**
La Cygne Generating Station
Management Unit: Scrubber Sludge Ponds

Please provide the information requested below for each surface impoundment or similar diked or bermed management unit(s) or management units designated as landfills which receive liquid-borne material for the storage or disposal of residuals or by-products from the combustion of coal, including, but not limited to, fly ash, bottom ash, boiler slag, or flue gas emission control residuals. This includes units that no longer receive coal combustion residues or by-products, but still contain free liquids.

1. Relative to the National Inventory of Dams criteria for High, Significant, Low, or Less-than-Low, please provide the potential hazard rating for each management unit and indicate who established the rating, what the basis of the rating is, and what federal or state agency regulates the unit(s). If the unit(s) does not have a rating, please note that fact.

The Management Unit does not have a known rating. The Kansas Department of Health and Environment regulates solid waste facilities in Kansas.

2. What year was each management unit commissioned and expanded?

The Management Unit was commissioned approximately in 1971 and expanded in 1979.

3. What materials are temporarily or permanently contained in the unit? Use the following categories to respond to this question: (1) fly ash; (2) bottom ash: (3) boiler slag; (4) flue gas emission control residuals; (5) other. If the management unit contains more than one type of material, please identify all that apply. Also, if you identify "other," please specify the other types of materials that are temporarily or permanently contained in the unit(s).

Fly ash and flue gas emission control residuals.

4. Was the management unit(s) designed by a Professional Engineer? Is or was the construction of the waste management unit(s) under the supervision of a Professional Engineer? Is inspection and monitoring of the safety of the waste management unit(s) under the supervision of a Professional Engineer?

The Management Unit original pond and expansion pond were designed by a Professional Engineer. The construction drawings for the Management Unit were sealed by a Professional Engineer. Inspection and monitoring of the safety of the Management Unit is completed under the supervision of a Professional Engineer.

5. When did the company last assess or evaluate the safety (i.e., structural integrity) of the management unit(s)? Briefly describe the credentials of those conducting the structural integrity assessments/evaluations. Identify actions taken or planned by facility personnel as a result of

these assessments or evaluations. If corrective actions were taken, briefly describe the credentials of those performing the corrective actions, whether they were company employees or contractors. If the company plans an assessment or evaluation in the future, when is it expected to occur?

The Management Unit is visually inspected on approximately a weekly basis by operational or security personnel. The last visual assessment or evaluation of the safety (i.e., structural integrity) of the Management Unit by a Professional Engineer was in Spring 2009. There has been no known assessment or evaluation of the safety (i.e., structural integrity) of the Management Unit beyond these visual inspections. There have been no known actions taken or planned by facility personnel as a result of the visual inspections of the Management Unit. There are no planned assessments or evaluation of this Management Unit in the future beyond the visual inspections.

6. When did a State or a Federal regulatory official last inspect or evaluate the safety (structural integrity) of the management unit(s)? If you are aware of a planned state or federal inspection or evaluation in the future, when is it expected to occur? Please identify the Federal or State regulatory agency or department which conducted or is planning the inspection or evaluation. Please provide a copy of the most recent official inspection report or evaluation.

There have been no known State or Federal regulatory official inspection or evaluation of the safety (structural integrity) the Management Unit; although, the Kansas Department of Health and Environment conducts an annual inspection of the permitted landfill which includes this Management Unit. We are not aware of a planned state or federal inspection or evaluation in the future beyond the Kansas Department of Health and Environment's annual inspection of the permitted landfill which includes this Management Unit.

7. Have assessments or evaluations, or inspections conducted by State or Federal regulatory officials conducted within the past year uncovered a safety issue(s) with the management unit(s), and, if so, describe the actions that have been or are being taken to deal with the issue or issues. Please provide any documentation that you have for these actions.

There has been no known assessments or evaluations, or inspections conducted by State or Federal regulatory officials conducted within the past year that uncovered a safety issue(s) with the Management Unit.

8. What is the surface area (acres) and total storage capacity of each of the management units? What is the volume of material currently stored in each of the management unit(s)? Please provide the date that the volume measurement(s) was taken. Please provide the maximum height of the management units(s). The basis for determining the maximum height is explained later in this Enclosure.

The Management Unit's surface area is approximately 483 acres and the total storage capacity is approximately 15,000,000 cubic yards. The capacity measurements were made as of 2009. The volume of material currently stored in the Management Unit is estimated today to

be approximately 11,000,000 cubic yards. The Management Unit's Dam Height, pursuant to Enclosure A, is approximately 45 feet.

9. Please provide a brief history of known spills or unpermitted releases from the unit within the last ten years, whether or not these were reported to State or federal regulatory agencies. For purposes of this question, please include only releases to surface water or to the land (do not include releases to groundwater).

In July 2007, September of 2007, and May 2009 there were unpermitted releases of recirculation water from the Management Unit due to unusual rainfall events. The water decanted from an emergency spillway. Normally, the Management Unit is nondischarging because the water is recirculated to the generation unit or evaporates.

10. Please identify all current legal owner(s) and operator(s) at the facility.

The current legal owners of La Cygne Generating Station are Kansas City Power & Light Company and Kansas Gas and Electric Company. The current operator of the LaCygne Generating Station is Kansas City Power & Light Company.

June 3, 2009

Mr. Eric C. Staab, PE
Kansas Department of Health and Environment
Bureau of Water
1000 S.W. Jackson, Suite 420
Topeka, Kansas 66612-1367

Re: Air Quality Control (AQP) Pond Emergency Discharge
Kansas City Power & Light (KCP&L) Company
La Cygne Generating Station
La Cygne, Kansas

Dear Mr. Staab:

As a follow-up to a May 4, 2009 e-mail sent to you from Paul Ling, KCP&L Environmental Manager, attached are the monitoring results of the emergency discharge from the AQC pond at KCP&L's La Cygne Generating Station. Normally, the AQC impoundments operate in a no-discharge, recycle/evaporative mode. However, due to the unusually heavy spring rains in the La Cygne area, an emergency discharge from the AQC pond system was necessary to protect the embankments and avoid a catastrophic release.

Water was released from the AQC pond continuously from May 4 through May 15 and for a brief period on May 16. Due to an oversight, a Total Suspended Solids analysis was not conducted on the first day sample and sulfide instead of sulfate was analyzed for the first three daily samples.

Please contact me at (816) 654-1767 if you have any questions, comments or require any additional information.

Sincerely,

Robert C. Beck
Environmental Services

Attachment

cc: S. Lister
A. Stimatze
T. Goin

KCP&L AQC POND EMERGENCY DISCHARGE MONITORING REPORT

Facility Name: La Cygne Generating Station
County: Linn County
NPDES Permit Number: I-MC18-PO01

Discharge Period: May 4, 2009 to May 16, 2009
Month: May-09

Day	Air Quality Control (AQC) Pond Emergency Discharge								
	Flow (MGD)	Sampling Time	Temp (°F)	pH (SU)	TSS (mg/L)	Chloride (mg/L)	Fluoride (mg/L)	Sulfate (mg/L)	Mercury (ug/L)
1									
2									
3									
4	2.88	9:45 AM	64.9	7.79	NT	672	10.8	NT	<0.20
5	14.40	9:20 AM	66.2	7.8	28.0	711	10.9	NT	<0.20
6	5.76	10:00 AM	66.2	7.8	34.0	702	11.0	NT	<0.20
7	5.76	10:10 AM	68.0	7.9	18.0	741	11.3	2,800	<0.20
8	5.76	11:00 AM	68.0	7.9	58.0	694	10.5	2,710	<0.20
9	5.76	12:00 PM	69.8	7.9	49.0	722	10.9	2,650	<0.20
10	4.32	11:15 AM	68.0	7.9	55.0	671	10.1	2,580	<0.20
11	2.88	9:10 AM	66.2	7.9	27.0	666	10.2	2,590	<0.20
12	2.16	10:10 AM	66.2	8.0	60.0	601	11.7	2,300	<0.20
13	1.44	8:15 AM	68.0	7.9	60.0	586	11.5	2,260	<0.20
14	0.72	9:20 AM	68.0	7.9	56.0	587	11.4	2,330	<0.20
15	1.44	10:40 AM	71.6	7.9	119.0	626	11.2	2,320	<0.20
16	NT		NT	NT	NT	NT	NT	NT	NT
17									
18									
19									
20									
21									
22									
23									
24									
25									
26									
27									
28									
29									
30									
31									

Measured Daily Max.	NA	NA	NA	NA	NA	NA	NA	NA	NA
Permitted Daily Max.	NA	NA	NA	NA	NA	NA	NA	NA	NA
Measured Daily Avg.	NA	NA	NA	NA	NA	NA	NA	NA	NA
Permitted Daily Avg.	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sample Frequency	D	D	D	D	D	D	D	D	D

NA = Not Applicable, NT = Not tested, D = Daily, TSS = Total Suspended Solids

Pace Analytical Services, Inc.
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

May 14, 2009

Ms. Theresa Goin
KCPL Lacygne Station
25166 E. 2200 Rd.
Lacygne, KS 66040

RE: Project: AQC Lower Pond
Pace Project No.: 6058151

Dear Ms. Goin:
Enclosed are the analytical results for sample(s) received by the laboratory on May 04, 2009. The results relate only to the samples included in this report. Results reported herein conform to the most current NELAC standards, where applicable, unless otherwise narrated in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Connie Gardner

Connie Gardner

connie.gardner@pacelabs.com
Project Manager

Enclosures

cc: Bob Beck, KCPL Lacygne Station
Andrew Stimatze, KCPL Lacygne Station

Pace Analytical Services, Inc.
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

CERTIFICATIONS

Project: AQC Lower Pond
Pace Project No.: 6058151

Kansas Certification IDs
Utah Certification #: 9135995665
Texas Certification #: T104704407-08-TX
Oklahoma Certification #: 9205/9935
Nevada Certification #: KS000212008A
Louisiana Certification #: 03055
Kansas/NELAP Certification #: E-10116
Iowa Certification #: 118
Illinois Certification #: 001191
Arkansas Certification #: 05-008-0
A2LA Certification #: 2456.01

Pace Analytical Services, Inc.
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Lenexa, KS 66219
(913)599-5665

SAMPLE SUMMARY

Project: AQC Lower Pond
Pace Project No.: 6058151

Lab ID	Sample ID	Matrix	Date Collected	Date Received
6058151001	**AQC LOWER POND**	Water	05/04/09 09:45	05/04/09 11:19

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SAMPLE ANALYTE COUNT

Project: AQC Lower Pond
Pace Project No.: 6058151

Lab ID	Sample ID	Method	Analysts	Analytes Reported
6058151001	AQC LOWER POND	EPA 300.0	RAB	2
		EPA 7470	SMW	1
		SM 4500-S-2 F	KPZ	1

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ANALYTICAL RESULTS

Project: AQC Lower Pond
Pace Project No.: 6058151

Sample: AQC LOWER POND **Lab ID: 6058151001** Collected: 05/04/09 09:45 Received: 05/04/09 11:19 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
7470 Mercury	Analytical Method: EPA 7470 Preparation Method: EPA 7470							
Mercury	ND	ug/L	0.20	1	05/07/09 11:47	05/07/09 16:52	7439-97-6	
4500S2F Sulfide, Iodometric	Analytical Method: SM 4500-S-2 F							
Sulfide	ND	mg/L	0.50	1		05/11/09 16:15		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0							
Chloride	**672**	mg/L	50.0	50		05/12/09 17:03	16887-00-6	
Fluoride	**10.8**	mg/L	0.40	2		05/13/09 15:15	16984-48-8	

Pace Analytical Services, Inc.
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

QUALITY CONTROL DATA

Project: AQC Lower Pond
Pace Project No.: 6058151

QC Batch: MERP/3501
QC Batch Method: EPA 7470
Analysis Method: EPA 7470
Analysis Description: 7470 Mercury
Associated Lab Samples: 6058151001

METHOD BLANK: 479174
Matrix: Water
Associated Lab Samples: 6058151001

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Mercury	ug/L	ND	0.20	05/07/09 16:33	

LABORATORY CONTROL SAMPLE: 479175

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Mercury	ug/L	5	5.0	100	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 479176 479177

Parameter	Units	6057955020 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Mercury	ug/L	0.33	5	5	5.1	5.1	95	95	75-125	0	10	

Pace Analytical Services, Inc.
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

QUALITY CONTROL DATA

Project: AQC Lower Pond
Pace Project No.: 6058151

QC Batch: WET/17514
QC Batch Method: SM 4500-S-2 F
Analysis Method: SM 4500-S-2 F
Analysis Description: 4500S2F Sulfide, Iodometric
Associated Lab Samples: 6058151001

METHOD BLANK: 480643
Matrix: Water
Associated Lab Samples: 6058151001

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Sulfide	mg/L	ND	0.50	05/11/09 16:15	

LABORATORY CONTROL SAMPLE: 480644

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Sulfide	mg/L	10	10.4	104	80-120	

MATRIX SPIKE SAMPLE: 480645

Parameter	Units	6058263010 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Sulfide	mg/L	ND	20	22.4	112	75-125	

SAMPLE DUPLICATE: 480646

Parameter	Units	6058263009 Result	Dup Result	RPD	Max RPD	Qualifiers
Sulfide	mg/L	ND	ND		15	

Pace Analytical Services, Inc.
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

QUALITY CONTROL DATA

Project: AQC Lower Pond
Pace Project No.: 6058151

QC Batch: WETA/9834
QC Batch Method: EPA 300.0
Analysis Method: EPA 300.0
Analysis Description: 300.0 IC Anions
Associated Lab Samples: 6058151001

METHOD BLANK: 480996 Matrix: Water
Associated Lab Samples: 6058151001

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Chloride	mg/L	ND	1.0	05/12/09 13:10	
Fluoride	mg/L	ND	0.20	05/12/09 13:10	

LABORATORY CONTROL SAMPLE: 480997

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Chloride	mg/L	5	4.7	94	90-110	
Fluoride	mg/L	5	4.8	96	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 480998 480999

Parameter	Units	6058283001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Chloride	mg/L	5.0	5	5	9.6	9.6	91	92	60-125	0	5	
Fluoride	mg/L	ND	5	5	4.8	4.8	92	93	80-116	1	7	

MATRIX SPIKE SAMPLE: 481000

Parameter	Units	6058211002 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Chloride	mg/L	7.8	5	12.3	91	60-125	
Fluoride	mg/L	0.44	5	5.0	92	80-116	

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QUALIFIERS

Project: AQC Lower Pond
Pace Project No.: 6058151

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to changes in sample preparation, dilution of the sample aliquot, or moisture content.

ND - Not Detected at or above adjusted reporting limit.

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

S - Surrogate

1,2-Diphenylhydrazine (8270 listed analyte) decomposes to Azobenzene.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

Pace Analytical is NELAP accredited. Contact your Pace PM for the current list of accredited analytes.

U - Indicates the compound was analyzed for, but not detected.

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CHAIN-OF-CUSTODY / Analytical Request D ument

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

Page: of

1306667

Section A Required Client Information:

Company:	KCP&L
Address:	E 2200 Rd La Cygne, KS
Email To:	Theresa Gorn / Andy S
Phone:	Fax:
Requested Due Date/TAT:	

Section B Required Project Information:

Report To:	
Copy To:	
Purchase Order No.:	
Project Name:	
Project Number:	

Section C Invoice Information:

Attention:	
Company Name:	
Address:	
Pace Quote Reference:	
Pace Project Manager:	
Pace Profile #:	

REGULATORY AGENCY

☐ NPDES ☐ GROUND WATER ☐ DRINKING WATER
☐ UST ☐ RCRA ☑ OTHER

Site Location STATE:

Requested Analysis Filtered (Y/N)

6058151

Section D Required Client Information

Matrix Codes MATRIX / CODE: Drinking Water DW, Water WT, Waste Water WW, Product P, Soil/Solid SL, Oil OL, Wipe WP, Air AR, Tissue TS, Other OT

SAMPLE ID (A-Z, 0-9 / ,-) Sample IDs MUST BE UNIQUE

ITEM #	SAMPLE ID	MATRIX CODE	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED COMPOSITE START DATE	TIME	COMPOSITE END/GRAB DATE	TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test	Fluoride	Chloride	Sulfide	Mercury							Residual Chlorine (Y/N)	Pace Project No./ Lab I.D.
1	AQC lower pond	WT		5/4/09	0945				1	1																	OTHR	BP34	BP3N 1.5 BP32 16	001
2																														
3																														
4																														
5																														
6																														
7																														
8																														
9																														
10																														
11																														
12																														

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS			
10+4 add'l days while discharging	Andy Stimatze	5/4/09	11:19	[signature]	5/4	1119	17.1	N	—	Y
							Temp in °C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)

ORIGINAL

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Bill Porter

SIGNATURE of SAMPLER:

DATE Signed (MM/DD/YY):

*Important Note: By signing this form you are accepting Pace's NET 30 day payment terms and agreeing to late charges of 1.5% per month for any invoices not paid within 30 days.

F-ALL-Q-020rev.07, 15-May-2007

Sample Condition Upon Receipt

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Client Name: KCP&L Project # 605851

5/14

Courier: ☐ Fed Ex ☐ UPS ☐ USPS ☑ Client ☐ Commercial ☐ Pace Other _____

[redacted]

Tracking #: _____

Custody Seal on Cooler/Box Present: ☐ yes ☑ no Seals Intact: ☐ yes ☑ no

Packing Material: ☐ Bubble Wrap ☐ Bubble Bags ☑ None ☐ Other _____ AQC Lower Pad

Thermometer Used T-189 T-142 Type of Ice: Wet Blue (None) ☐ Samples on ice, cooling process has begun

Cooler Temperature 17.1 Biological Tissue is Frozen: Yes No

Temp should be above freezing to 6°C

Date and Initials of person examining contents: BW 5/14

Comments:

Chain of Custody Present:	☑Yes ☐No ☐N/A	1.
Chain of Custody Filled Out:	☑Yes ☐No ☐N/A	2.
Chain of Custody Relinquished:	☑Yes ☐No ☐N/A	3.
Sampler Name & Signature on COC:	☑Yes ☐No ☐N/A	4.
Samples Arrived within Hold Time:	☑Yes ☐No ☐N/A	5.
Short Hold Time Analysis (<72hr):	☐Yes ☑No ☐N/A	6.
Rush Turn Around Time Requested:	☐Yes ☑No ☐N/A	7.
Sufficient Volume:	☑Yes ☐No ☐N/A	8.
Correct Containers Used:	☐Yes ☑No ☐N/A	9.
-Pace Containers Used:	☐Yes ☑No ☐N/A	
Containers Intact:	☑Yes ☐No ☐N/A	10.
Filtered volume received for Dissolved tests	☐Yes ☑No ☐N/A	11.
Sample Labels match COC:	☑Yes ☐No ☐N/A	12.
-Includes date/time/ID/Analysis Matrix: WT		
All containers needing preservation have been checked.	☑Yes ☐No ☐N/A	13. VOL RCV'D IN 1 LARGE UNPRESERVED CONTAINER POURED OFF VOL INTO PRESERVED HNO3 CONT AND NAOH & ZN CONT
All containers needing preservation are found to be in compliance with EPA recommendation.	☑Yes ☐No ☐N/A	
exceptions: VOA, coliform, TOC, O&G, WI-DRO (water)	☐Yes ☑No	Initial when completed BW / Lot # of added preservative
Samples checked for dechlorination:	☐Yes ☐No ☑N/A	14.
Headspace in VOA Vials (>6mm):	☐Yes ☐No ☑N/A	15.
Trip Blank Present:	☐Yes ☑No ☐N/A	16.
Trip Blank Custody Seals Present	☐Yes ☑No ☐N/A	
Pace Trip Blank Lot # (if purchased): _____		

Client Notification/ Resolution: Copy COC to Client? Y / N Field Data Required? Y / N

Person Contacted: _____ Date/Time: _____

Comments/ Resolution: _____

Project Manager Review: ACC for (LG) **Date:** 05/04/09

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e out of hold, incorrect preservative, out of temp, incorrect containers)

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May 18, 2009

Ms. Theresa Goin
KCPL Lacygne Station
25166 E. 2200 Rd.
Lacygne, KS 66040

RE: Project: WATER 5/4-5/6
Pace Project No.: 6058262

Dear Ms. Goin:
Enclosed are the analytical results for sample(s) received by the laboratory on May 06, 2009. The results relate only to the samples included in this report. Results reported herein conform to the most current NELAC standards, where applicable, unless otherwise narrated in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Connie Gardner

Connie Gardner

connie.gardner@pacelabs.com
Project Manager

Enclosures

cc: Bob Beck, KCPL Lacygne Station
Andrew Stimatze, KCPL Lacygne Station

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CERTIFICATIONS

Project: WATER 5/4-5/6
Pace Project No.: 6058262

Kansas Certification IDs
Utah Certification #: 9135995665
Texas Certification #: T104704407-08-TX
Oklahoma Certification #: 9205/9935
Nevada Certification #: KS000212008A
Louisiana Certification #: 03055
Kansas/NELAP Certification #: E-10116
Iowa Certification #: 118
Illinois Certification #: 001191
Arkansas Certification #: 05-008-0
A2LA Certification #: 2456.01

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SAMPLE SUMMARY

Project: WATER 5/4-5/6
Pace Project No.: 6058262

Lab ID	Sample ID	Matrix	Date Collected	Date Received
6058262001	**001**	Water	05/05/09 09:54	05/06/09 13:55
6058262002	**002**	Water	05/05/09 09:40	05/06/09 13:55
6058262003	**003**	Water	05/05/09 09:00	05/06/09 13:55
6058262004	**004**	Water	05/05/09 09:47	05/06/09 13:55
6058262005	**005**	Water	05/05/09 10:00	05/06/09 13:55
6058262006	**007**	Water	05/05/09 10:04	05/06/09 13:55
6058262007	**008**	Water	05/05/09 10:10	05/06/09 13:55
6058262008	**013**	Water	05/05/09 10:45	05/06/09 13:55
6058262009	**AQC LOWER POND**	Water	05/05/09 09:20	05/06/09 13:55
6058262010	**AQC LOWER POND**	Water	05/06/09 10:00	05/06/09 13:55

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SAMPLE ANALYTE COUNT

Project: WATER 5/4-5/6
Pace Project No.: 6058262

Lab ID	Sample ID	Method	Analysts	Analytes Reported
6058262001	**001**	EPA 1664A	MRT	1
		SM 2540D	SAH	1
6058262002	**002**	EPA 1664A	MRT	1
		SM 2540D	SAH	1
6058262003	**003**	SM 2540D	SAH	1
6058262004	**004**	SM 2540D	SAH	1
6058262005	**005**	EPA 1664A	MRT	1
		SM 2540D	SAH	1
6058262006	**007**	EPA 1664A	MRT	1
		SM 2540D	SAH	1
6058262007	**008**	EPA 1664A	MRT	1
		SM 2540D	SAH	1
6058262008	**013**	SM 2540D	SAH	1
6058262009	**AQC LOWER POND**	EPA 300.0	RAB	2
		EPA 7470	SMW	1
		SM 2540D	SAH	1
		SM 4500-S-2 F	KPZ	1
6058262010	**AQC LOWER POND**	EPA 300.0	RAB	2
		EPA 7470	SMW	1
		SM 2540D	SAH	1
		SM 4500-S-2 F	KPZ	1

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ANALYTICAL RESULTS

Project: WATER 5/4-5/6
Pace Project No.: 6058262

Sample: AQC LOWER POND **Lab ID: 6058262009** Collected: 05/05/09 09:20 Received: 05/06/09 13:55 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
7470 Mercury	Analytical Method: EPA 7470 Preparation Method: EPA 7470							
Mercury	ND	ug/L	0.20	1	05/07/09 11:47	05/07/09 16:57	7439-97-6	
2540D Total Suspended Solids	Analytical Method: SM 2540D							
Total Suspended Solids	**28.0**	mg/L	5.0	1		05/08/09 10:02		
4500S2F Sulfide, Iodometric	Analytical Method: SM 4500-S-2 F							
Sulfide	ND	mg/L	0.50	1		05/11/09 16:15		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0							
Chloride	**711**	mg/L	50.0	50		05/13/09 11:17	16887-00-6	
Fluoride	**10.9**	mg/L	0.40	2		05/13/09 14:43	16984-48-8	

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ANALYTICAL RESULTS

Project: WATER 5/4-5/6
Pace Project No.: 6058262

Sample: AQC LOWER POND **Lab ID: 6058262010** Collected: 05/06/09 10:00 Received: 05/06/09 13:55 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
7470 Mercury	Analytical Method: EPA 7470 Preparation Method: EPA 7470							
Mercury	ND	ug/L	0.20	1	05/07/09 11:47	05/07/09 16:59	7439-97-6	
2540D Total Suspended Solids	Analytical Method: SM 2540D							
Total Suspended Solids	**34.0**	mg/L	5.0	1		05/11/09 11:28		
4500S2F Sulfide, Iodometric	Analytical Method: SM 4500-S-2 F							
Sulfide	ND	mg/L	0.50	1		05/11/09 16:15		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0							
Chloride	**702**	mg/L	50.0	50		05/13/09 11:49	16887-00-6	
Fluoride	**11.0**	mg/L	0.40	2		05/13/09 14:59	16984-48-8	

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QUALITY CONTROL DATA

Project: WATER 5/4-5/6
Pace Project No.: 6058262

QC Batch: MERP/3501 Analysis Method: EPA 7470
QC Batch Method: EPA 7470 Analysis Description: 7470 Mercury
Associated Lab Samples: 6058262009, 6058262010

METHOD BLANK: 479174 Matrix: Water
Associated Lab Samples: 6058262009, 6058262010

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Mercury	ug/L	ND	0.20	05/07/09 16:33	

LABORATORY CONTROL SAMPLE: 479175

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Mercury	ug/L	5	5.0	100	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 479176 479177

Parameter	Units	6057955020 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Mercury	ug/L	0.33	5	5	5.1	5.1	95	95	75-125	0	10	

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QUALITY CONTROL DATA

Project: WATER 5/4-5/6
Pace Project No.: 6058262

QC Batch: WET/17480 Analysis Method: SM 2540D
QC Batch Method: SM 2540D Analysis Description: 2540D Total Suspended Solids
Associated Lab Samples: 6058262007, 6058262008, 6058262009

METHOD BLANK: 479568 Matrix: Water
Associated Lab Samples: 6058262007, 6058262008, 6058262009

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Total Suspended Solids	mg/L	ND	5.0	05/08/09 10:00	

SAMPLE DUPLICATE: 479569

Parameter	Units	6058262007 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Suspended Solids	mg/L	ND	5.0		17	

SAMPLE DUPLICATE: 479570

Parameter	Units	6058262008 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Suspended Solids	mg/L	ND	ND		17	

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QUALITY CONTROL DATA

Project: WATER 5/4-5/6
Pace Project No.: 6058262

QC Batch: WET/17506 Analysis Method: SM 2540D
QC Batch Method: SM 2540D Analysis Description: 2540D Total Suspended Solids
Associated Lab Samples: 6058262010

METHOD BLANK: 480488 Matrix: Water
Associated Lab Samples: 6058262010

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Total Suspended Solids	mg/L	ND	5.0	05/11/09 11:24	

SAMPLE DUPLICATE: 480489

Parameter	Units	6058276001 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Suspended Solids	mg/L	234	226	3	17	

SAMPLE DUPLICATE: 480490

Parameter	Units	6058288003 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Suspended Solids	mg/L	57.0	56.0	2	17	

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QUALITY CONTROL DATA

Project: WATER 5/4-5/6
Pace Project No.: 6058262

QC Batch: WET/17514 Analysis Method: SM 4500-S-2 F
QC Batch Method: SM 4500-S-2 F Analysis Description: 4500S2F Sulfide, Iodometric
Associated Lab Samples: 6058262009, 6058262010

METHOD BLANK: 480643 Matrix: Water
Associated Lab Samples: 6058262009, 6058262010

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Sulfide	mg/L	ND	0.50	05/11/09 16:15	

LABORATORY CONTROL SAMPLE: 480644

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Sulfide	mg/L	10	10.4	104	80-120	

MATRIX SPIKE SAMPLE: 480645

Parameter	Units	6058263010 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Sulfide	mg/L	ND	20	22.4	112	75-125	

SAMPLE DUPLICATE: 480646

Parameter	Units	6058263009 Result	Dup Result	RPD	Max RPD	Qualifiers
Sulfide	mg/L	ND	ND		15	

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QUALITY CONTROL DATA

Project: WATER 5/4-5/6
Pace Project No.: 6058262

QC Batch: WETA/9839
QC Batch Method: EPA 300.0
Analysis Method: EPA 300.0
Analysis Description: 300.0 IC Anions
Associated Lab Samples: 6058262009, 6058262010

METHOD BLANK: 481206 Matrix: Water
Associated Lab Samples: 6058262009, 6058262010

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Chloride	mg/L	ND	1.0	05/13/09 01:08	
Fluoride	mg/L	ND	0.20	05/13/09 01:08	

LABORATORY CONTROL SAMPLE: 481207

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Chloride	mg/L	5	4.6	93	90-110	
Fluoride	mg/L	5	4.9	97	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 481208 481209

Parameter	Units	6058223003 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Chloride	mg/L	366	500	500	850	869	97	101	60-125	2	5	
Fluoride	mg/L	ND	500	500	493	504	99	101	80-116	2	7	

MATRIX SPIKE SAMPLE: 481210

Parameter	Units	6058241001 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Chloride	mg/L	529	250	776	99	60-125	
Fluoride	mg/L	ND	250	235	94	80-116	

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QUALIFIERS

Project: WATER 5/4-5/6
Pace Project No.: 6058262

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to changes in sample preparation, dilution of the sample aliquot, or moisture content.

ND - Not Detected at or above adjusted reporting limit.

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

S - Surrogate

1,2-Diphenylhydrazine (8270 listed analyte) decomposes to Azobenzene.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

Pace Analytical is NELAP accredited. Contact your Pace PM for the current list of accredited analytes.

U - Indicates the compound was analyzed for, but not detected.

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CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

Page: of

1219034

Section A Required Client Information:	Section B Required Project Information:	Section C Invoice Information:
Company: KCPL	Report To: Andy Stimatze	Attention:
Address: La Cygne, KS	Copy To: Theresa Goin	Company Name:
		Address:
Email To:	Purchase Order No.:	Pace Quote Reference:
Phone: Fax:	Project Name:	Pace Project Manager:
Requested Due Date/TAT:	Project Number:	Pace Profile #:

REGULATORY AGENCY

☐ NPDES ☐ GROUND WATER ☐ DRINKING WATER

☐ UST ☐ RCRA ☐ OTHER _____

Site Location STATE: _____

Section D Required Client Information

SAMPLE ID
(A-Z, 0-9 / ,-)
Sample IDs MUST BE UNIQUE

Matrix Codes — MATRIX / CODE
Drinking Water DW
Water WT
Waste Water WW
Product P
Soil/Solid SL
Oil OL
Wipe WP
Air AR
Tissue TS
Other OT

Requested Analysis Filtered (Y/N)

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED COMPOSITE START DATE	COMPOSITE START TIME	COMPOSITE END/GRAB DATE	COMPOSITE END/GRAB TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives: Unpreserved	H_2SO_4	HNO_3	HCl	NaOH + Zn Acetate	$Na_2S_2O_3$	Methanol	Other	Analysis Test Y/N	Oil & Grease	Cl	Fluoride	Sulfate	Mercury	Residual Chlorine (Y/N)	Pace Project No./ Lab I.D.
1	001		G	5/5	0954			26	3	1	2								✓	✓				2(BK1S) 1(BK2N)		60058262
2	002		G	5/5	0940			28	3	1	2								✓	✓				↓		001
3	003		G	5/5	0900			19	1	1										✓				1(BK2N)		002
4	004		G	5/5	0947			19	1	1										✓				↓		003
5	005		G	5/5	1000			34	3	1	2								✓	✓				2(BK1S) 1(BK2N)		004
6	007		G	5/5	1004			21	3	1	2								✓	✓						005
7	008		G	5/5	1010			26	3	1	2								✓	✓				↓		006
8	013		G	5/5	1045			13	1	1										✓				1(BK2N)		007
9	AQC Lower Pond		G	5/4	0945			18	3	1		1		1					✓	✓	✓	✓	✓	✓		NO Sample Recd
10	AQC Lower Pond		G	5/5	0920			19	3	1		1		1					✓	✓	✓	✓	✓	1(BK1N) 1(BK2N) 1(BK3S)1:5	1(BK3N)1:5	008
11	AQC Lower Pond		G	5/6	1000			19	3	1		1		1					✓	✓	✓	✓	✓	1(BK3S) 1(BK3S)1:5	1(BK3N)1:5	009
12																										

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS: Temp in °C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)
	Jim Mansfield/KCPL	05/06/09	1355	David Newman	5/6/09	13:55	4.5	Y	N	Y

ORIGINAL

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER:

SIGNATURE of SAMPLER: DATE Signed (MM/DD/YY):

*Important Note: By signing this form you are accepting Pace's NET 30 day payment terms and agreeing to late charges of 1.5% per month for any invoices not paid within 30 days.

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Sample Condition Upon Receipt

Client Name: KCPL Project # 605-8262

Courier: ☐ Fed Ex ☐ UPS ☐ USPS ☒ Client ☐ Commercial ☐ Pace Other _____ [redacted] 5/18

Tracking #: _____

Custody Seal on Cooler/Box Present: ☐ yes ☒ no Seals intact: ☐ yes ☒ no

Packing Material: ☒ Bubble Wrap ☐ Bubble Bags ☐ None ☐ Other _____ Loose Styrofoam

Thermometer Used (T-189) T-142 Type of Ice: (Wet) Blue None ☐ Samples on ice, cooling process has begun

Cooler Temperature 4.1, 5.5 Biological Tissue is Frozen: Yes No

Temp should be above freezing to 6°C

Date and Initials of person examining contents: DNS 5/6/09 1435

Comments:

Chain of Custody Present:	☒Yes	☐No	☐N/A
Chain of Custody Filled Out:	☒Yes	☐No	☐N/A
Chain of Custody Relinquished:	☒Yes	☐No	☐N/A
Sampler Name & Signature on COC:	☒Yes	☐No	☐N/A
Samples Arrived within Hold Time:	☒Yes	☐No	☐N/A
Short Hold Time Analysis (<72hr):	☐Yes	☒No	☐N/A
Rush Turn Around Time Requested:	☐Yes	☒No	☐N/A
Sufficient Volume:	☒Yes	☐No	☐N/A
Correct Containers Used:	☒Yes	☐No	☐N/A
-Pace Containers Used:	☒Yes	☐No	☐N/A
Containers Intact:	☒Yes	☐No	☐N/A
Filtered volume received for Dissolved tests	☐Yes	☐No	☒N/A
Sample Labels match COC:	☒Yes	☐No	☐N/A
-Includes date/time/ID/Analysis Matrix: water			
All containers needing preservation have been checked.	☐Yes	☐No	☒N/A
All containers needing preservation are found to be in compliance with EPA recommendation.	☐Yes	☐No	☒N/A
exceptions: VOA, coliform, TOC, O&G, WI-DRO (water)	☒Yes	☐No	
Samples checked for dechlorination:	☐Yes	☐No	☒N/A
Headspace in VOA Vials (>6mm):	☐Yes	☐No	☒N/A
Trip Blank Present:	☐Yes	☐No	☒N/A
Trip Blank Custody Seals Present	☐Yes	☐No	☒N/A
Pace Trip Blank Lot # (If purchased): NA			

9. one BP2N has AQC Pond on the side of bottle but 13 on the label,
10. one BP2N has 015 on lid no other ID.
12. AQC Lowers Pond no samples w/ date 5/4/09
13. Initial when completed NA Lot # of added preservative
14.
15.
16.

Client Notification/ Resolution: Copy COC to Client? (Y) / N Field Data Required? Y / N

Person Contacted: Andy Stuecee Date/Time: 5/6/09

Comments/ Resolution: Bottle w/ 2 ID's is AQC Pond - collected extra See JSS, No Samples sent for AQC Lower Pond for 5/4/09, Already Rec'd earlier this week. DS

Project Manager Review: DS 5/7/09 **Date:**

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e out of hold, incorrect preservative, out of temp, incorrect containers)

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May 29, 2009

Ms. Theresa Goin
KCPL Lacygne Station
25166 E. 2200 Rd.
Lacygne, KS 66040

RE: Project: LOWER POND - 5/12-15/09
Pace Project No.: 6058880

Dear Ms. Goin:
Enclosed are the analytical results for sample(s) received by the laboratory on May 16, 2009. The results relate only to the samples included in this report. Results reported herein conform to the most current NELAC standards, where applicable, unless otherwise narrated in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Anna Custer for
Connie Gardner
connie.gardner@pacelabs.com
Project Manager

Enclosures

cc: Bob Beck, KCPL Lacygne Station
Andrew Stimatze, KCPL Lacygne Station

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CERTIFICATIONS

Project: LOWER POND - 5/12-15/09
Pace Project No.: 6058880

Kansas Certification IDs
Washington Certification #: C2069
Utah Certification #: 9135995665
Texas Certification #: T104704407-08-TX
Oklahoma Certification #: 9205/9935
Nevada Certification #: KS000212008A
Louisiana Certification #: 03055
Kansas/NELAP Certification #: E-10116
Iowa Certification #: 118
Illinois Certification #: 001191
Arkansas Certification #: 05-008-0
A2LA Certification #: 2456.01

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SAMPLE SUMMARY

Project: LOWER POND - 5/12-15/09
Pace Project No.: 6058880

Lab ID	Sample ID	Matrix	Date Collected	Date Received
6058880001	**LOWER POND**	Water	05/12/09 10:10	05/16/09 00:10
6058880002	**LOWER POND**	Water	05/13/09 08:15	05/16/09 00:10
6058880003	**LOWER POND**	Water	05/14/09 09:20	05/16/09 00:10
6058880004	**LOWER POND**	Water	05/15/09 10:40	05/16/09 00:10

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SAMPLE ANALYTE COUNT

Project: LOWER POND - 5/12-15/09
Pace Project No.: 6058880

Lab ID	Sample ID	Method	Analysts	Analytes Reported
6058880001	**LOWER POND**	EPA 300.0	MRT	3
		EPA 7470	JDH	1
		SM 2540D	HMW	1
6058880002	**LOWER POND**	EPA 300.0	MRT	3
		EPA 7470	JDH	1
		SM 2540D	HMW	1
6058880003	**LOWER POND**	EPA 300.0	MRT	3
		EPA 7470	JDH	1
		SM 2540D	HMW	1
6058880004	**LOWER POND**	EPA 300.0	MRT	3
		EPA 7470	JDH	1
		SM 2540D	HMW	1

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ANALYTICAL RESULTS

Project: LOWER POND - 5/12-15/09
Pace Project No.: 6058880

Sample: LOWER POND **Lab ID: 6058880001** Collected: 05/12/09 10:10 Received: 05/16/09 00:10 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
7470 Mercury	Analytical Method: EPA 7470 Preparation Method: EPA 7470							
Mercury	ND	ug/L	0.20	1	05/22/09 12:15	05/22/09 16:32	7439-97-6	
2540D Total Suspended Solids	Analytical Method: SM 2540D							
Total Suspended Solids	**60.0**	mg/L	5.0	1		05/19/09 10:31		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0							
Chloride	**601**	mg/L	100	100		05/26/09 22:16	16887-00-6	
Fluoride	**11.7**	mg/L	2.0	10		05/26/09 21:58	16984-48-8	
Sulfate	**2300**	mg/L	200	200		05/28/09 04:25	14808-79-8	

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ANALYTICAL RESULTS

Project: LOWER POND - 5/12-15/09
Pace Project No.: 6058880

Sample: LOWER POND **Lab ID: 6058880002** Collected: 05/13/09 08:15 Received: 05/16/09 00:10 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
7470 Mercury	Analytical Method: EPA 7470 Preparation Method: EPA 7470							
Mercury	ND	ug/L	0.20	1	05/22/09 12:15	05/22/09 16:33	7439-97-6	
2540D Total Suspended Solids	Analytical Method: SM 2540D							
Total Suspended Solids	**60.0**	mg/L	5.0	1		05/19/09 10:46		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0							
Chloride	**586**	mg/L	100	100		05/26/09 22:53	16887-00-6	
Fluoride	**11.5**	mg/L	2.0	10		05/26/09 22:35	16984-48-8	
Sulfate	**2260**	mg/L	200	200		05/28/09 04:43	14808-79-8	

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ANALYTICAL RESULTS

Project: LOWER POND - 5/12-15/09
Pace Project No.: 6058880

Sample: LOWER POND **Lab ID: 6058880003** Collected: 05/14/09 09:20 Received: 05/16/09 00:10 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
7470 Mercury	Analytical Method: EPA 7470 Preparation Method: EPA 7470							
Mercury	ND	ug/L	0.20	1	05/22/09 12:15	05/22/09 16:35	7439-97-6	
2540D Total Suspended Solids	Analytical Method: SM 2540D							
Total Suspended Solids	**56.0**	mg/L	5.0	1		05/21/09 14:17		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0							
Chloride	**587**	mg/L	100	100		05/27/09 00:07	16887-00-6	
Fluoride	**11.4**	mg/L	2.0	10		05/26/09 23:12	16984-48-8	
Sulfate	**2330**	mg/L	200	200		05/28/09 05:02	14808-79-8	

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ANALYTICAL RESULTS

Project: LOWER POND - 5/12-15/09
Pace Project No.: 6058880

Sample: LOWER POND **Lab ID: 6058880004** Collected: 05/15/09 10:40 Received: 05/16/09 00:10 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
7470 Mercury	Analytical Method: EPA 7470 Preparation Method: EPA 7470							
Mercury	ND	ug/L	0.20	1	05/26/09 16:50	05/27/09 14:01	7439-97-6	
2540D Total Suspended Solids	Analytical Method: SM 2540D							
Total Suspended Solids	**119**	mg/L	5.0	1		05/22/09 14:04		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0							
Chloride	**626**	mg/L	100	100		05/27/09 00:44	16887-00-6	
Fluoride	**11.2**	mg/L	2.0	10		05/27/09 00:26	16984-48-8	
Sulfate	**2320**	mg/L	200	200		05/28/09 05:57	14808-79-8	

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QUALITY CONTROL DATA

Project: LOWER POND - 5/12-15/09
Pace Project No.: 6058880

QC Batch: WET/17632 Analysis Method: SM 2540D
QC Batch Method: SM 2540D Analysis Description: 2540D Total Suspended Solids
Associated Lab Samples: 6058880001

METHOD BLANK: 484230 Matrix: Water
Associated Lab Samples: 6058880001

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Total Suspended Solids	mg/L	ND	5.0	05/19/09 10:30	

SAMPLE DUPLICATE: 484231

Parameter	Units	6058649001 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Suspended Solids	mg/L	50.0	51.0	2	17	

SAMPLE DUPLICATE: 484232

Parameter	Units	6058653003 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Suspended Solids	mg/L	133	127	5	17	

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QUALITY CONTROL DATA

Project: LOWER POND - 5/12-15/09
Pace Project No.: 6058880

QC Batch: WET/17634 Analysis Method: SM 2540D
QC Batch Method: SM 2540D Analysis Description: 2540D Total Suspended Solids
Associated Lab Samples: 6058880002

METHOD BLANK: 484241 Matrix: Water
Associated Lab Samples: 6058880002

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Total Suspended Solids	mg/L	ND	5.0	05/19/09 10:40	

SAMPLE DUPLICATE: 484242

Parameter	Units	6058688001 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Suspended Solids	mg/L	268	260	3	17	

SAMPLE DUPLICATE: 484243

Parameter	Units	6058698001 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Suspended Solids	mg/L	88.0	95.0	8	17	

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QUALITY CONTROL DATA

Project: LOWER POND - 5/12-15/09
Pace Project No.: 6058880

QC Batch: WET/17675 Analysis Method: SM 2540D
QC Batch Method: SM 2540D Analysis Description: 2540D Total Suspended Solids
Associated Lab Samples: 6058880003

METHOD BLANK: 485214 Matrix: Water
Associated Lab Samples: 6058880003

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Total Suspended Solids	mg/L	ND	5.0	05/21/09 13:51	

SAMPLE DUPLICATE: 485215

Parameter	Units	6058833003 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Suspended Solids	mg/L	17.0	17.0	0	17	

SAMPLE DUPLICATE: 485216

Parameter	Units	6058858001 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Suspended Solids	mg/L	8.0	9.0	12	17	

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QUALITY CONTROL DATA

Project: LOWER POND - 5/12-15/09
Pace Project No.: 6058880

QC Batch: WET/17696
QC Batch Method: SM 2540D
Analysis Method: SM 2540D
Analysis Description: 2540D Total Suspended Solids
Associated Lab Samples: 6058880004

METHOD BLANK: 486055
Matrix: Water
Associated Lab Samples: 6058880004

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Total Suspended Solids	mg/L	ND	5.0	05/22/09 14:04	

SAMPLE DUPLICATE: 486056

Parameter	Units	6058874004 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Suspended Solids	mg/L	20.0	21.0	5	17	

SAMPLE DUPLICATE: 486057

Parameter	Units	6058910005 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Suspended Solids	mg/L	160	163	2	17	

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QUALITY CONTROL DATA

Project: LOWER POND - 5/12-15/09
Pace Project No.: 6058880

QC Batch: MERP/3532 Analysis Method: EPA 7470
QC Batch Method: EPA 7470 Analysis Description: 7470 Mercury
Associated Lab Samples: 6058880001, 6058880002, 6058880003

METHOD BLANK: 486096 Matrix: Water
Associated Lab Samples: 6058880001, 6058880002, 6058880003

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Mercury	ug/L	ND	0.20	05/22/09 16:19	

LABORATORY CONTROL SAMPLE: 486097

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Mercury	ug/L	5	4.6	91	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 486098 486099

Parameter	Units	6058880001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Mercury	ug/L	ND	5	5	3.9	3.9	78	77	75-125	0	20	

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QUALITY CONTROL DATA

Project: LOWER POND - 5/12-15/09
Pace Project No.: 6058880

QC Batch: MERP/3535 Analysis Method: EPA 7470
QC Batch Method: EPA 7470 Analysis Description: 7470 Mercury
Associated Lab Samples: 6058880004

METHOD BLANK: 487526 Matrix: Water
Associated Lab Samples: 6058880004

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Mercury	ug/L	ND	0.20	05/27/09 13:58	

LABORATORY CONTROL SAMPLE: 487527

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Mercury	ug/L	5	4.7	94	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 487528 487529

Parameter	Units	6058880004 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Mercury	ug/L	ND	5	5	3.5	3.5	68	67	75-125	1	20	M0

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QUALITY CONTROL DATA

Project: LOWER POND - 5/12-15/09
Pace Project No.: 6058880

QC Batch: WETA/9980 Analysis Method: EPA 300.0
QC Batch Method: EPA 300.0 Analysis Description: 300.0 IC Anions
Associated Lab Samples: 6058880001, 6058880002, 6058880003, 6058880004

METHOD BLANK: 487679 Matrix: Water
Associated Lab Samples: 6058880001, 6058880002, 6058880003, 6058880004

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Chloride	mg/L	ND	1.0	05/26/09 19:11	
Fluoride	mg/L	ND	0.20	05/26/09 19:11	

LABORATORY CONTROL SAMPLE: 487680

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Chloride	mg/L	5	4.8	97	90-110	
Fluoride	mg/L	5	5.2	103	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 487684 487685

Parameter	Units	6058893005 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Chloride	mg/L	71.4	50	50	120	122	97	101	60-125	2	5	
Fluoride	mg/L	ND	50	50	51.8	51.4	101	101	80-116	1	7	

MATRIX SPIKE SAMPLE: 487686

Parameter	Units	6058946004 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Chloride	mg/L	38.6	25	61.2	90	60-125	
Fluoride	mg/L	ND	25	25.3	98	80-116	

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QUALIFIERS

Project: LOWER POND - 5/12-15/09
Pace Project No.: 6058880

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to changes in sample preparation, dilution of the sample aliquot, or moisture content.

ND - Not Detected at or above adjusted reporting limit.

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

S - Surrogate

1,2-Diphenylhydrazine (8270 listed analyte) decomposes to Azobenzene.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

Pace Analytical is NELAP accredited. Contact your Pace PM for the current list of accredited analytes.

U - Indicates the compound was analyzed for, but not detected.

ANALYTE QUALIFIERS

M0 Matrix spike recovery was outside laboratory control limits.

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CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

Page: 1 of 1

1219089

Section A Required Client Information:	Section B Required Project Information:	Section C Invoice Information:
Company: KCPL - La Cygne	Report To: A. Heaston T. Golik	Attention:
Address: La Cygne KS	Copy To:	Company Name:
Email To:	Purchase Order No.:	Address:
Phone: Fax:	Project Name:	Pace Quote Reference:
Requested Due Date/TAT:	Project Number:	Pace Project Manager:
		Pace Profile #:

REGULATORY AGENCY

☐ NPDES ☐ GROUND WATER ☐ DRINKING WATER

☐ UST ☐ RCRA ☐ OTHER _____

Site Location STATE: _____

Requested Analysis Filtered (Y/N)

ITEM #	Section D Required Client Information — SAMPLE ID (A-Z, 0-9 / ,-) Sample IDs MUST BE UNIQUE	Matrix Codes MATRIX / CODE	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED COMPOSITE START DATE	COMPOSITE START TIME	COMPOSITE END/GRAB DATE	COMPOSITE END/GRAB TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives: Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Y/N	Analysis Test: TSS	Cl	F	Hg	SO_4					Residual Chlorine (Y/N)	Pace Project No./ Lab I.D.
1	Lower Pond	Drinking Water DW; Water WT; Waste Water WW; Product P; Soil/Solid SL; Oil OL; Wipe WP; Air AR; Tissue TS; Other OT	WW	G	~~5/12~~		5/12	10:10		3	2									X	X	X	X						BP2U BP3U 001
2			WW	G			5/13	08:15		3	2									X	X	X	X						002
3			WW	G			5/14	09:20		3	2									X	X	X	X						003
4			WW	G			5/15	10:40		2	1									X	X	X	X						BP1U 004
5																													
6	Note:																												
7	Samples 5/12 - 5/14																												
8	were sampled																												
9	by B. Porter																												
10																													
11																													
12																													

Residual Chlorine (Y/N): BRCL

Pace Project No./ Lab I.D.: 6058880

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS: Temp in °C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)
	Michael L. Michler	5/15/09	1400	Joseph L. Kramer	5-15-2009	1400				
					5/16/09	0010	3.1	Y	N	Y

ORIGINAL

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Michael L. Michler

SIGNATURE of SAMPLER: Michael L. Michler DATE Signed (MM/DD/YY): 5/15/09

*Important Note: By signing this form you are accepting Pace's NET 30 day payment terms and agreeing to late charges of 1.5% per month for any invoices not paid within 30 days.

F-ALL-Q-020rev.07, 15-May-2007

Sample Condition Upon Receipt

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Client Name: KCPL Project # 6058880

Courier: ☐ Fed Ex ☐ UPS ☐ USPS ☐ Client ☑ Commercial ☐ Pace Other ECI

Optional: Proj. Due Date: Proj. Name:

Tracking #:

Custody Seal on Cooler/Box Present: ☐ yes ☑ no Seals intact: ☐ yes ☑ no

Packing Material: ☐ Bubble Wrap ☐ Bubble Bags ☑ None ☐ Other

Thermometer Used T-189 T-142 T-191 Type of Ice: (Wet) Blue None ☐ Samples on ice, cooling process has begun

Cooler Temperature 3.1 Biological Tissue is Frozen: Yes No

Temp should be above freezing to 6°C

Date and Initials of person examining contents: 5/16/09 KS

		Comments:
Chain of Custody Present:	☑Yes ☐No ☐N/A	1.
Chain of Custody Filled Out:	☑Yes ☐No ☐N/A	2.
Chain of Custody Relinquished:	☑Yes ☐No ☐N/A	3.
Sampler Name & Signature on COC:	☑Yes ☐No ☐N/A	4.
Samples Arrived within Hold Time:	☑Yes ☐No ☐N/A	5.
Short Hold Time Analysis (<72hr):	☐Yes ☑No ☐N/A	6.
Rush Turn Around Time Requested:	☐Yes ☑No ☐N/A	7.
Sufficient Volume:	☑Yes ☐No ☐N/A	8.
Correct Containers Used:	☑Yes ☐No ☐N/A	9.
-Pace Containers Used:	☑Yes ☐No ☐N/A	
Containers Intact:	☑Yes ☐No ☐N/A	10.
Filtered volume received for Dissolved tests	☐Yes ☐No ☑N/A	11.
Sample Labels match COC:	☑Yes ☐No ☐N/A	12.
-Includes date/time/ID/Analysis Matrix: WT		
All containers needing preservation have been checked.	☑Yes ☐No ☐N/A	13.
All containers needing preservation are found to be in compliance with EPA recommendation.	☑Yes ☐No ☐N/A	
exceptions: VOA, coliform, TOC, O&G, WI-DRO (water)	☐Yes ☑No	Initial when completed KS / Lot # of added preservative
Samples checked for dechlorination:	☐Yes ☐No ☑N/A	14.
Headspace in VOA Vials (>6mm):	☐Yes ☐No ☑N/A	15.
Trip Blank Present:	☐Yes ☐No ☑N/A	16.
Trip Blank Custody Seals Present	☐Yes ☐No ☑N/A	
Pace Trip Blank Lot # (if purchased):		KS

Client Notification/ Resolution: Copy COC to Client? (Y) / N Field Data Required? Y / N

Person Contacted: Date/Time:

Comments/ Resolution:

Project Manager Review: 5/18/09 Date:

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e out of hold, incorrect preservative, out of temp, incorrect containers)

5/28/09

Lower Pond

CG

92

4/15/09 011 Sample Collection
Reese / Chandel
Time: 0130 Flow 515000 gpm
pH 8.4 Temp: 27.0

This is the 3rd Sample for the 24 hr. Composite.

4/15/09 011 Sample Porter
Time 0850 Temp 27.1 °C
pH 8.54 Total Cl - 0.04

4/15/09 Miller These sample (4/15) were tested using Hach HQ30d pH meter & Colorimeter II The pH meter was calibrated 4/15/09

5/4/09 Time 0945 AQC lower pond sampled at overflow.
Flow rate about 2000 gpm
pH 7.79 temp. 18.3
Bill Porter

5/5/09 Porter / Mansfield

outfall	Time	Temp °C	pH	Flow	Total Cl
001	0954	26 ~~27~~	8.7	500	—
002	0940	28	7.8	400	—
003	0900	19	7.9	600	—
004	0947	19	8.9	3	—
005	1000	34	7.7	70	—
006	No Flow				
007	1004	21	7.9	30	—
008	1010	26	7.6	20	—
011	1120	27	8.0	350,000	.09
013	1045	13	8.0	—	—
AQC lower	0920	19	7.8	10,000	—

The above samples were tested using Hach HQ30D. Calibrated with 7 & 10 buffer. Cl^- was analyzed by Hach II colorimeter.

AQC lower pond sample at 1000 flow rate 4,000 gpm pH 7.8 temp 19°C 5/6/09 Bill Porter

5/7/09 1010 AQC lower pond sample collected pH 7.9 temp 20°C Bill Porter 4,000 gpm

94

*Entered by Katrina 6/11/09

5/8/09 AQC Pond overflow sampled close to weir ~11:00 am. Temp ≅ 20°C pH ≅ 7.9 by Jim Mansfield. Flow 4,000 gpm

Mirable 6/9/09 Lower AQC Pond (Clear Water Sample Time 12:00 pH = 7.9 Temp 21°C Flow 4,000 gpm - pH & Temp - Hach HQ30d Cal at 7 & 10

5/10/09 Lower AQC Pond
1115 time 7.9 pH 20°C temp
Flow 3,000 gpm Sampled Bill Porter

5/11/09 Lower AQC Pond
0910 time 7.9 pH 19°C temp
Flow 2,000 gpm Sampled by Bill Porter

5/12/09 Lower AQC Pond
1010 8.0 pH 19°C temp
Flow 1,500 gpm Sampled by Bill Porter

5/13/09 Lower AQC Pond
time 0815 7.9 pH 20°C temp
Flow 1,000 gpm Sample by Bill Porter

5/14/09 Lower AQC pond
time 0930 pH 7.9 Temp 20°C
Flow 500 gpm Sampled by Bill Porter

5/15/09 Lower Dam - AQC
Time 10:40 pH = 7.9 Temp. = 22°C
Flow 1000 gpm

011 5/20/09 Bill Porter
Total Cl⁻ 0.13 Temp 32.7°C
pH 7.95 flow 525,000 gpm

La Cygne Station
NPDES

For The Week Of Aug 10, 2010 **Date** _____ **Time** _____ **Signature** _____

Observations		
Area	**Source/Description**	**Visual Quality**
Sky Condition Clear **Outside Temperature** 90 °F. **Humidity** ____ % **Wind from** ____ @ ____ MPH		

		Free of debris and oily sheen (√)	Actions Required (No Action: √) (Maintenance: **MT**)	Comments
NPDES 003	Coal Pile Runoff Ponds	✓		
NPDES 011 (clearwater house)	Discharge Canal	✓		
NPDES 004	Sanitary Stabilization Lagoon	✓		
NPDES 002	Secondary Neutralization Pond	✓		
NPDES 001	Bottom Ash Pond	✓		
NPDES 005	Boiler Area Drains Pond	✓		
NPDES 006	Limestone Hopper Sump Pond	✓		
NPDES 007	Slag Tank Overflow Pond	✓		
NPDES 008	Turbine Area/Car Wash Settling Pond	✓		
NPDES 012	Lake La Cygne Discharge to North Sugar Creek	✓		
Supplemental		**Zero Ø Discharge (√)**		
AQC Pond(s)	Flue Gas Scrubber Wastewater Pond	✓		

URS

Memorandum

Date: September 14, 2010

To: Paul Ling – Kansas City Power & Light
Mark Adams – Kansas City Power & Light

From: Brian Linnan, P.E. – URS Corporation

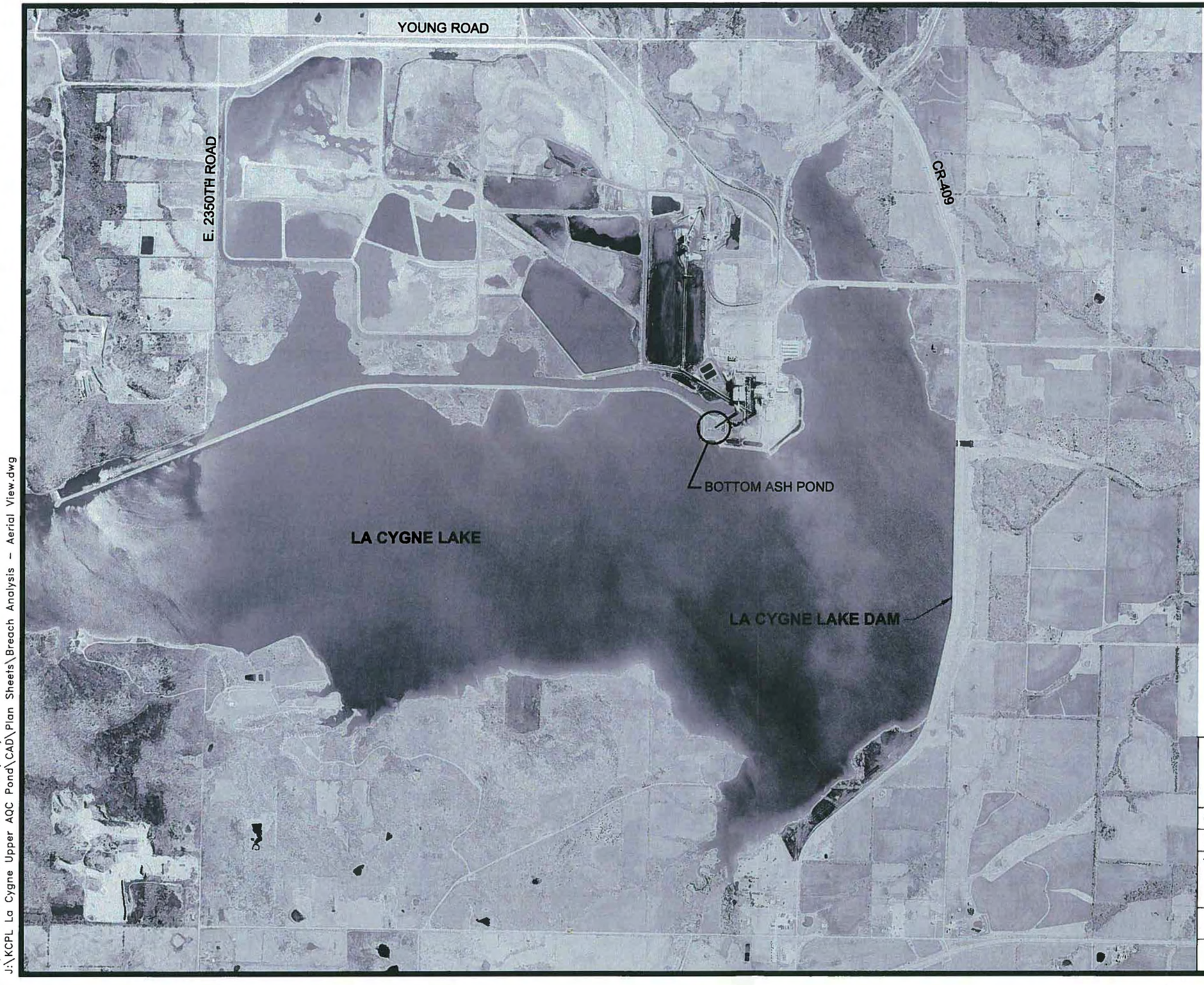
Subject: Breach Impact Analysis
Bottom Ash Pond
KCP&L – La Cygne Generating Station

This memorandum contains URS Corporation's evaluation of the potential impact of a breach or failure of the containment for the bottom ash pond shown on Figure 1. The pond is located adjacent to Lake La Cygne, which was constructed to provide water for the power plant. The pond was formed by a combination of excavating and filling; embankment heights are 12 feet or less. The surface area of the pond is approximately 1.7 acres and the total storage capacity of pond is approximately 19,000 cubic yard, or approximately 11.8 acre feet.

Black & Veatch prepared the design plans for Lake La Cygne. Sheet D-202 of the design plans for the dam (copy attached) shows the hydrological information for the dam. The drawing shows that, at the design storm (25.27 inches over 24 hours) the lake reaches a maximum elevation of 847.1 feet at the peak of the hydrograph. The stage-storage curve shows that the lake contains 60,000 acre-feet of water at this elevation. The top of dam elevation is 854 feet, so there is approximately 7 feet of freeboard when the lake is at its maximum elevation.

Calculations were made by URS to evaluate the effects of an instantaneous release of the entire storage capacity of the bottom ash pond on the lake level. Since the pond is in close proximity to the lake, a breach would release stored material into the lake causing a rise in the lake level. Of interest is the change in freeboard at the dam at the time of the breach. For the purpose of evaluating the impact of a breach, it was assumed that the bottom ash pond would fail when the lake was at its maximum elevation. Drawing D-202 shows that the surface area of the lake at elevation 847.1 is 3,350 acres. A release of 11.8 acre feet from the bottom ash pond would raise the lake level approximately 0.0035 feet, an imperceptible rise. The freeboard at the dam at the time of the breach would remain approximately 7 feet, so there would be no impact to the stability of the dam or reservoir from the breach. .

Attachments



N

1700 0 1700

SCALE IN FEET

URS 8300 College Blvd., Suite 200
Overland Park, Kansas 66210

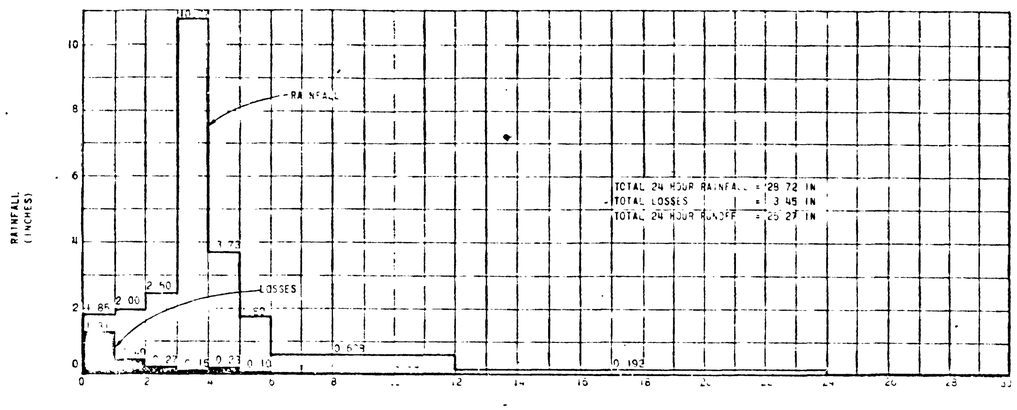
CLIENT: KANSAS CITY POWER & LIGHT COMPANY

LOCATION: LA CYGNE GENERATING STATION

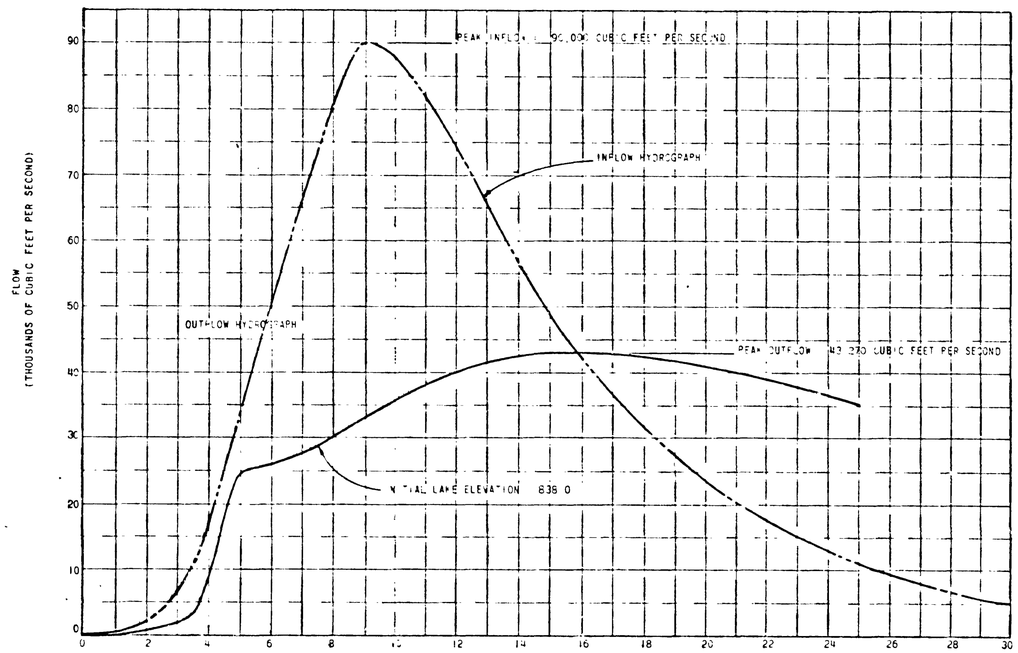
TITLE: **BOTTOM ASH POND AND LA CYGNE LAKE TOE DAM LOCATION**

DRAWN BY	CHECKED BY	APPROVED BY
TMS	WDS	BDL
PROJECT NO.	DATE	FIGURE NO.
16530629	SEPT. 2010	1

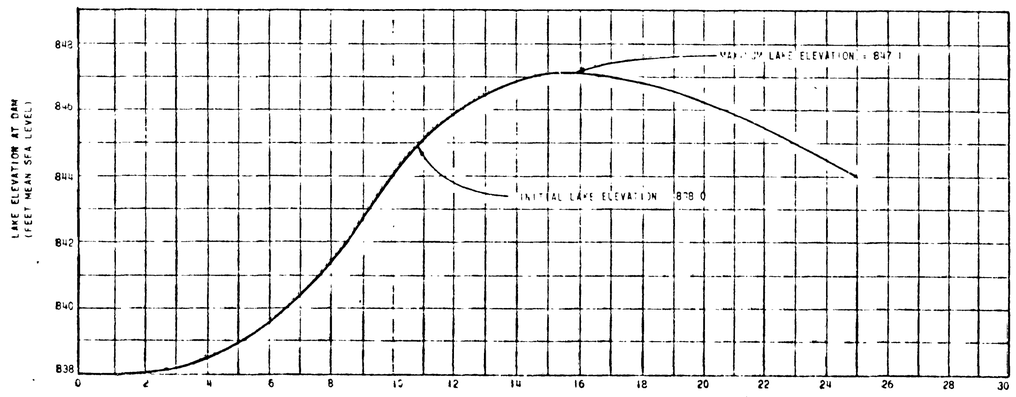
September 17, 2010 10:18:23 am (mik)
J:\KCPL La Cygne Upper AQC Pond\CAD\Plan Sheets\Breach Analysis - Aerial View.dwg



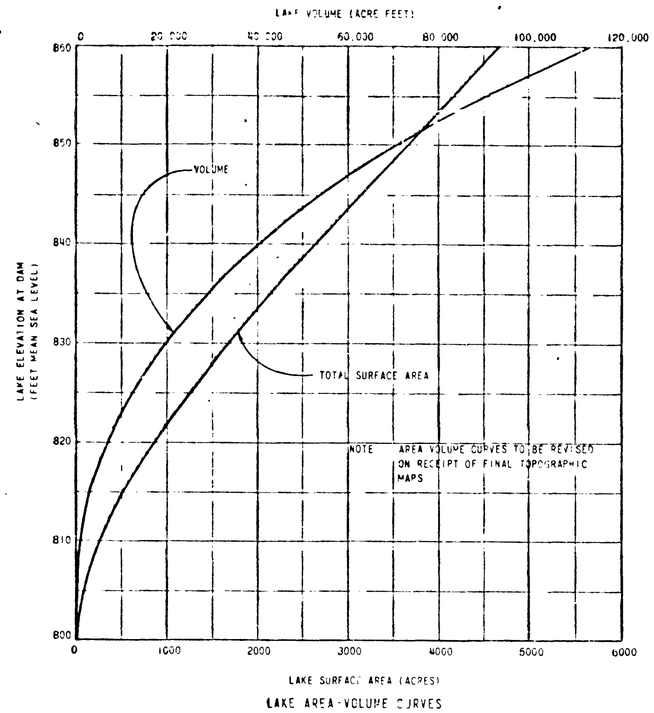
RAINFALL DISTRIBUTION AND LOSSES
SPILLWAY DESIGN STORM



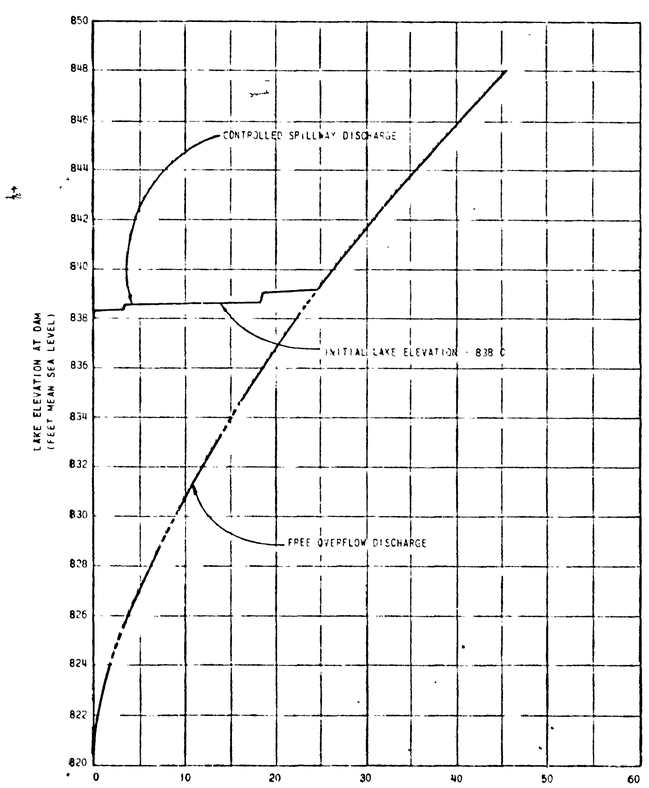
INFLOW AND OUTFLOW HYDROGRAPHS
SPILLWAY DESIGN FLOOD



LAKE ELEVATION AT DAM DURING
SPILLWAY DESIGN FLOOD



LAKE AREA-VOLUME CURVES



SPILLWAY CAPACITY CURVES
CONTROLLED DISCHARGE AND FREE OVERFLOW

PERTINENT DATA
LACYGNE LAKE

GENERAL

PROJECT LOCATION	55 MILES SOUTH OF KANSAS CITY IN MIAMI COUNTY AND LINN COUNTY, KANSAS
DAM LOCATION	SIX MILES EAST OF LA CYGNE, KANSAS, ON NORTH SUGAR CREEK (SECTIONS 4 AND 5, T20S, R25E) 10 5 STREAM MILES NORTHEAST OF THE CONFLUENCE WITH THE MARAIS DES CYGNES RIVER
DRAINAGE AREA	57 5 SQUARE MILES

DAM

TYPE	ZONED EARTHFILL WITH CLAY CORE
LENGTH (FT)	6970
MAXIMUM HEIGHT ABOVE STREAMBED (FT)	60
TOP WIDTH (FT)	36
TOP ELEVATION WITHOUT CAMBER ALLOWANCE (FT, MSL)	854
FREEBOARD (FT)	7
SLOPES	
UPSTREAM	2:1 AND 3 1
DOWNSTREAM	3 1

LAKE

MINIMUM OPERATING LAKE LEVEL = 831 0 FT , MSL	
SURFACE AREA (ACRES)	1,750
VOLUME (ACRE-FT)	21,000
NORMAL OPERATING LAKE LEVEL = 838 0 TO 840 0 FT, MSL	
LAKE LEVEL = 838 0 FT, MSL	
SURFACE AREA (ACRES)	2 420
VOLUME (ACRE-FT)	36,000
LAKE LEVEL = 840 0 FT MSL	
SURFACE AREA (ACRES)	2,600
VOLUME (ACRE-FT)	40 000
MAXIMUM OPERATING LAKE LEVEL AT DAM = 847 FT, MSL	
SURFACE AREA (ACRES)	3,350
VOLUME (ACRE-FT)	60 000
SEDIMENT RESERVE (ACRE FT)	500

SPILLWAY

TYPE	RADIAL GATE CONTROLLED CONCRETE OGEE WITH HYDRAULIC JUMP STILLING BASIN
DESIGN FLOOD	
PEAK INFLOW (CFS)	90,000
VOLUME (ACRE FT)	92 300
TOTAL RAINFALL (INCHES PER 24 HOURS)	28 72
GROSS CREST LENGTH (FT)	95
NET CREST LENGTH (FT)	88
CREST ELEVATION (FT, MSL)	820 5
DISCHARGE CAPACITY AT MAXIMUM LAKE LEVEL (CFS)	43,270
RADIAL GATES	
NUMBER	2
SIZE (WIDTH x HEIGHT) (FT)	44x23
TOP ELEVATION OF GATE (FT, MSL) WITH 9'-5" CUTOUT AT EL 840 0 FT, MSL (ONE GATE ONLY)	842 0

GENERAL NOTES

DWG. NO. REFERENCE DRAWINGS

THIS IS A REPRODUCED DRAWING
ONE-HALF ORIGINAL SIZE

NO	BY	CK	APP	DATE	REVISIONS AND RECORD OF ISSUE
2				5 14 62	ISSUED FOR BIDS
1				2 7 62	ISSUED FOR REMOVAL OF RIVER

KANSAS CITY POWER & LIGHT COMPANY
KANSAS GAS AND ELECTRIC COMPANY
LA CYGNE LAKE

DAM
HYDROLOGIC DATA

APPROVED FOR CONSTRUCTION	DEPT HEAD	DES ENGR	CHECKED	DRAWN	PROJ NO.
BY _____ DATE _____	CLM	DJW		SMS	4993

BLACK & VEATCH
CONSULTING ENGINEERS KANSAS CITY, MISSOURI

DRAWING NO. D-202

NOTICE OF COMPLIANCE/NON-COMPLIANCE

KANSAS DEPARTMENT OF HEALTH AND ENVIRONMENT
Division of Environment
Waste Management Program

Initial Inspection: (Yes) No Follow-up Inspection: Yes (No) Complaint: Yes (No)
Hazardous Waste: LDF ( ) TSF ( ) GEN ( ) KG ( ) SQ ( ) UNV ( ) NOT A GEN ( ) OTHER ( )
Used Oil: UOG ( ) UOT ( ) UOM ( ) UOP ( ) UOB ( )
Solid Waste: SLF ( ) TRS ( ) CDL ( ) ILF (X) YWC ( ) SWP ( ) HHW ( ) OBS ( ) MTP ( ) WTM ( ) WTP ( ) WTR ( ) WTT ( )

TO: KCPL 7/13/10
Facility Name Date

25166 East 2200 Road LaCygne KS 66040 Linn
Address City State Zip Code County

EPA Identification No.

Solid Waste Permit No. 0337

This inspection was conducted to determine compliance with the state and federal solid and/or hazardous waste statutes and regulations.

☐ Violations As Follows ☒ No Violations Identified

Citation	Description of Violation

☐ Other Comments/Concerns:

This notice is provided to call immediate attention to those areas of non-compliance. This notice does not constitute a compliance order issued by KDHE and may not be a complete listing of all violations which may be identified as a result of this inspection. Your facility must submit in writing within _____ days of receipt of this notice a description of all corrective actions taken. Any corrective actions taken by your facility will be considered in subsequent enforcement follow-up.

Your response must be submitted to:

Kansas Department of Health and Environment
Southeast District Office
Waste Management Program
1500 W. 7th
Chanute, Kansas 66720-9701

If you have any questions concerning this Notice or wish to discuss your response, you may call me at (620) 431-2390 or Bureau of Waste Management in the Topeka office at (785) 296-1600.

This Notice was prepared by:
Wesley A. Page
Date 7/13/10

I, the undersigned hereby acknowledge that I have received and read this Notice.
Printed Name: Theresa Goin
Signature: T. Goin
Title: ECA
Date 7/13/10

COPIES: White-Facility; Yellow-Bureau of Waste Management; Blue-District

SCANNED

08-015 21.2A.1

KANSAS

RODERICK L. BREMBY, SECRETARY

KATHLEEN SEBELIUS, GOVERNOR

DEPARTMENT OF HEALTH AND ENVIRONMENT

October 27, 2004

Kansas City Power & Light Company
Route 1, 25166 E 2200 Road
LaCygne, KS 66040

RE: Kansas Water Pollution Control
Permit No. I-MC18-PO01
LaCygne Generating Station

Dear Permittee:

You have fulfilled all the filing requirements for a Kansas Water Pollution Control Permit and Authorization to Discharge under the National Pollutant Discharge Elimination System (NPDES). We are pleased to forward your new permit. While it is permissible to make as many copies as needed for monitoring and reporting purposes, you need to retain the original permit for your files.

We suggest you carefully read the terms and conditions of your permit and understand these terms and conditions are enforceable under both State and Federal law.

Please notice the reporting paragraph on page 2 of your permit, where all reports are due by the 28th day of the scheduled noted. Please submit reports to the, Kansas Department of Health and Environment, Bureau of Water-TSS, 1000 SW Jackson St., Suite 420, Topeka, Kansas 66612-1367.

If you have any questions concerning this permit, contact Ed Dillingham at (785) 296-5513.

Sincerely,

Karl Mueldener, P.E.
Director, Bureau of Water

pc: SE - District Office
OA - Permit File

DIVISION OF ENVIRONMENT
Bureau of Water
CURTIS STATE OFFICE BUILDING, 1000 SW JACKSON ST., STE. 420, TOPEKA, KS 66612-1367
Voice 785-296-5500 Fax 785-296.0086 http://www.kdhe.state.ks.us/

Kansas Permit No.: I-MC18-PO01

Federal Permit No.: KS0080071

KANSAS WATER POLLUTION CONTROL PERMIT AND AUTHORIZATION TO DISCHARGE UNDER THE NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

Pursuant to the Provisions of Kansas Statutes Annotated 65-164 and 65-165, the Federal Water Pollution Control Act as amended, (33 U.S.C. 1251 et seq; the "Act"),

Owner:	Kansas City Power & Light Company
Owner's Address:	Route 1, 25166E 2200 Road La Cygne, KS 66040
Facility Name:	La Cygne Generating Station
Facility Location:	SE ¼ Section 33, Township 19S, Range 25E, Linn County, Kansas
Receiving Stream & Basin:	North Sugar Creek via Lake La Cygne *Marais des Cygnes River Basin*

is authorized to discharge from the wastewater treatment facility described herein, in accordance with effluent limitations and monitoring requirements as set forth herein.

This permit shall become effective November 1, 2004 will supersede all previous wastewater permits and/or agreements in effect for the facility described herein between the Kansas Department of Health and Environment and the permittee, and will expire October 31, 2009.

FACILITY DESCRIPTION

This facility generates electric power with the high pressure steam produced by fossil fuel combustion. Flue gas scrubber wastewater is directed to the non-discharging 534-acre air quality control pond. All other process wastewater, domestic wastewater and cooling water discharge to Lake La Cygne.

001 - Bottom ash transport water from unit #2 is treated in a settling pond prior to discharging into the discharge canal; approximately 12 mgd.

Secretary, Kansas Department of Health and Environment

October 26, 2004

Date

FACILITY DESCRIPTION: Continued

002 - The secondary neutralization pond receives wastewater from the unit #2 boiler area, unit #1 R.O. reject, primary acid neutralization pond, and sanitary waste stabilization pond effluent. Treatment: sedimentation and neutralization; Average flow 120,000 gpd.
003 - Runoff from coal pile runoff ponds, coal dumper building and crusher building wash down. Sedimentation occurs in the coal pile ponds prior to discharge to Lake La Cygne.
004 - The two-cell sanitary waste stabilization lagoon discharge (9000 gpd) through secondary neutralization pond to 002
005 - The boiler side plant and yard drains pond includes unit #2 boiler blowdown, unit #2 R.O. reject, unit #2 fan and pulverizer area drains, units #1 & #2 plant drains, and U2 boiler drains. Treatment: sedimentation; average discharge to Lake La Cygne 155,000 gpd.
006 - The limestone hopper sump pond discharge (average 50,000 gpd) to Lake La Cygne.
007 - The slag tank overflow pond including: unit #1 boiler area drains, unit #1 bottom ash transport overflow, unit #2 pretreatment system blow-off, and #1 neutralization basin to Lake La Cygne; average discharge 0.405 mgd.
008 - Units #1 and #2 turbine area drains and car wash through settling pond; average discharge to Lake La Cygne 0.08 mgd.
011 - The discharge canal receives 1,100 mgd of plant cooling water and the discharge from outfalls 001 and 002. The canal leads to Lake La Cygne.
012 - Lake La Cygne discharge to North Sugar Creek through dam. (An alternative location for this sampling is the outfall 013 service water intake monitoring location - See footnote 3).
013 - Service water intake monitoring location at a sampling valve in the chemical feed building prior to to the chemical feed eductor.

A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

The permittee is authorized to discharge from outfalls with serial numbers as specified in this permit. The effluent limitations shall become effective on the dates specified herein. Such discharges shall be controlled, limited and monitored by the permittee as specified. There shall be no discharge of floating solids or visible foam in other than trace amounts.

Monitoring reports shall be submitted monthly on or before the 28th day of the following month. In the event no discharge occurs, written notification is still required.

	EFFLUENT LIMITATIONS		MONITORING	
Effective Date	Final Upon Issuance		REQUIREMENTS	
Outfall Number and	Daily	Daily	Measurement	Sample
Effluent Parameter(s) Units	Average	Maximum	Frequency	Type
Outfall 001 - Bottom Ash Pond, [1]				
Outfall 002 - Secondary Neutralizing Pond, [1]				
Outfall 005 - Boiler Area Drains,				
Outfall 006 - Limestone Hopper Sump,				
Outfall 007 - Slag Tank Overflow, [1] and				
Outfall 008 - Turbine Area Drains [1]				
Flow - gpd		Monitor	Monthly	Estimate
Oil and Grease - mg/l	10	15	Monthly	Grab
Total Suspended Solids [1] - mg/l	30	100	Monthly	Grab
pH - Standard Units	within the range 6.0 and	9.0	Monthly	Grab

A. **EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS** (continued)

Effective Date Outfall Number and Effluent Parameter(s) Units	EFFLUENT LIMITATIONS Final Upon Issuance Daily Average		Daily Maximum	MONITORING REQUIREMENTS Measurement Frequency	Sample Type
Outfall 003 - Coal Pile Runoff Ponds Overflow					
Flow - gpd			Monitor	Monthly	Estimate
Total Suspended Solids - mg/l			50	Monthly	Grab
pH - Standard Units	within the range	6.0 and	9.0	Monthly	Grab
Outfall 004 - Main Plant Sanitary Waste Stabilization Lagoon					
Flow - MGD			Monitor	Monthly	Estimate
Biochemical Oxygen Demand (5 Day) - mg/l		30	45	Quarterly	Grab
Total Suspended Solids - mg/l		80	120	Quarterly	Grab
Fecal Coliform - col/100 ml			Monitor	Quarterly [2]	Grab
Outfall 011 - Discharge Canal					
Flow - MGD			Monitor	Twice Monthly	Estimate
Total Residual Oxidant - mg/l			0.2	Twice Monthly [4]	Grab
pH - Standard Units	within the range	6.0 and	9.0	Twice Monthly	Grab
Temperature - °F			Monitor	Twice Monthly	Grab
Monitoring Location 012 - Lake La Cygne Discharge to North Sugar Creek [3]					
Flow - MGD			Monitor	Monthly	Estimate
Nitrogen, Total - mg/l			Monitor	Quarterly	Grab
Phosphorus, Total - mg/l			Monitor	Quarterly	Grab
pH - Standard Units	within the range	6.0 and	9.0	Quarterly	Grab
Temperature - °F			Monitor	Monthly	Grab
Monitoring Location 013 - Service Water Intake					
Total Suspended Solids - mg/l			Monitor	Monthly	Grab

[1] A Total Suspended Solids (TSS) net allocation for outfalls 001, 002, 007, and 008 may be claimed when the service water intake is sampled concurrently with outfalls. The TSS net allocation is calculated by subtracting the service water intake value(s) from the outfall value(s). The monitoring report shall contain TSS values for the service water intake, outfall and net allocation.

[2] After the first two full years of sampling, permittee may request KDHE reduce the monitoring frequency or discontinue the requirement for further monitoring of this parameter.

A. **EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS** (continued)

[3] When conditions at the dam create an unsafe condition to collect a sample of the discharge, the facility may collect a sample at the outfall 013 service water intake monitoring location to represent water quality at the dam. Flow monitoring will not be required when the alternative location is used. The permittee must specify in the monthly monitoring report when the alternative location is used.

[4] During continuous chlorination for macroinvertebrate control (see supplemental condition no. 4) total residual oxidant shall be measured daily.

B. STANDARD CONDITIONS

In addition to the specified conditions stated herein, the permittee shall comply with the attached Standard Conditions dated August 1, 1996.

C. SCHEDULE OF COMPLIANCE

None

D. SUPPLEMENTAL CONDITIONS

1. There shall be no discharge of polychlorinated biphenyl compounds.

2. All samples and flow measurements required for permit monitoring shall be taken on the same day except for miscellaneous discharges related to stormwater runoff, oil storage area runoff, etc.

3. Miscellaneous discharges related to runoff are regulated by water quality criteria. Runoff contained in the oil storage dike area(s) shall be visually inspected to determine if removal of oil and grease is necessary prior to discharge.

4. Total residual oxidant may not be discharged from any single generating unit for more than two hours per day unless the discharger demonstrates to KDHE that discharge for more than two hours is required for macroinvertebrate control. Simultaneous multi-unit oxidation is permitted. Multi-unit oxidation must be designated in the monitoring reports. Upon identification of zebra mussel veligers in the intake water or the detection of adult zebra mussels in Lake La Cygne, the permittee, upon notification of KDHE - Bureau of Water, is allowed to provide continuous discharge of total residual oxidant over an extended period of time (up to 4 weeks). The discharge will still need to meet all permit limitations. Prior to start of the continuous oxidant addition, permittee shall notify KDHE of the amount of dechlorinating /debrominating chemicals that will be needed during the continuous oxidant addition and the quantity of the chemicals available at the facility. Alternative use of non-oxidizing biocides, such as quaternary amines, will need approval of a clam/mussel control plan prior to use.

D. **SUPPLEMENTAL CONDITIONS** (Continued)

5. The permittee shall develop and implement an oxidation schedule indicating the time, dosage and duration of applications for each unit. The records shall be maintained and made available for review upon KDHE or EPA request. During continuous oxidant addition for macroinvertabrate control, as indicated in supplemental condition no. 4 above, the permittee shall submit, as a part of the discharge monitoring report, an oxidation schedule indicating the time, dosage and duration of applications for each unit.

6. This permit shall be modified, or alternatively, revoked and reissued, to comply with any applicable effluent standard or limitation issued or approved under Sections 301(b)(2)(C) and (D), 304(b)(2) and 307(a)(2) of the Clean Water Act, if the effluent standard or limitation so issued or approved:

   a. Contains different conditions or is otherwise more stringent than any effluent limitation in the permit, or

   b. Controls any pollutant not limited in the permit.

   The permit as modified or reissued under this paragraph shall also contain any other requirements of the Act then applicable.

7. Changes in Discharges of Toxic Substances

   The permittee shall notify KDHE as soon as it knows or has reason to believe:

   a. That any activity has occurred or will occur which would result in the discharge, on a routine or frequent basis, of any toxic pollutant which is not limited in the permit, if that discharge will exceed the highest of the following notification levels:

      (1) One hundred micrograms per liter (100 µg/l);

      (2) Two hundred micrograms per liter (200 µg/l) for acrolein and acrylonitrile; five hundred micrograms per liter (500 µg/l) for 2,4-dinitrophenol and for 2-methyl-4,6-dinitrophenol; and one milligram per liter (1 mg/l) for antimony;

      (3) Five times the maximum concentration value reported for that pollutant in the permit application.

   b. That any activity has occurred or will occur which result in any discharge, on a non-routine or infrequent basis, of a toxic pollutant which is not limited in the permit if that discharge will exceed the highest of the following notification levels:

      (1) Five hundred micrograms per liter (500 µg/l);

      (2) One milligram per liter (1 mg/l) for antimony;

D. **SUPPLEMENTAL CONDITIONS** (Continued)

(3) Ten times the maximum concentration value reported for that pollutant in the permit application.

8. In the event the Environmental Protection Agency amends or promulgates the BPT, BAT and/or BCT effluent guideline limitations for a specific Point Source Category or any of the subcategories covering this facility, the permit will be revoked and reissued to incorporate the new limitation(s).

9. Toxic Substances - Water Treatment Additives. If the permittee utilizes or changes water treatment additives:

   a. After the mixing zone provided by Kansas Water Quality Standards, the discharge of water treatment additives shall not be harmful to human, animal or plant life uses in the receiving water.

   b. The permittee shall keep an ongoing log of the water treatment chemicals used, their potential concentration in the facility discharge, and the associated toxicity data for each chemical. A sample chemical additives evaluation log can be obtained from KDHE.

   c. The permittee shall provide KDHE, upon request, toxicity tests and/or a chemical additives evaluation log the permittee uses to determine if the requirements in the paragraphs above are being achieved. In the event the data indicate the requirements in the paragraphs above are not achieved, KDHE reserves the right to amend the facility's NPDES permit to specify additional terms and conditions for toxic substances.

10. Intermittent discharges such as demineralizer regeneration, coal pile runoff, etc. shall be sampled according to the designated measurement frequency when discharging.

11. The coal pile runoff pond shall be operated to maximize the settling of coal fines so as to minimize the amount of suspended solids released in the discharge.

12. There shall be no discharge from the old or new AQC ponds without prior approval from KDHE.

13. The use of earthen lagoons for the handling and treatment of certain types of industrial wastes is currently being reevaluated by the Kansas Department of Health and Environment. This is an ongoing effort resulting from increased emphasis, at both the state and federal level, in addressing source control as a mechanism for eliminating or minimizing the potential for groundwater contamination. The facility addressed by this permit has yet to be fully evaluated. As such, the Department may require the installation of groundwater monitoring wells or other necessary improvements to the wastewater handling and disposal system. The permittee will be notified and consulted concerning any monitoring well installation requirements or possible lagoon system modifications at a later

D. **SUPPLEMENTAL CONDITIONS** (Continued)

time. The installation of any monitoring wells or any modifications to the wastewater system requires prior approval by the Department.

14. Only domestic wastewater shall be directed to the sanitary waste treatment pond.

15. The wastewater treatment plant shall be under the supervision of a class I operator or higher who has been certified or is in the process of obtaining certification under K.S.A. 65-4501 et seq.

16. Permittee shall maintain and modify the existing stormwater pollution prevention plan as necessary in accordance with **ATTACHMENT A**. A copy of the SWP3 shall be kept on site and be available for KDHE or EPA inspection upon request.

17. Discharge of industrial stormwater (as defined in 40 CFR part 122.26 (b)(14)) from the facility, except for stormwater associated with construction activity disturbing 1 acre or more of soil, is authorized under this permit. Such discharges shall be in compliance with the Kansas Surface Water Quality Standards (KAR 28-16-28) and in conformance with the facility stormwater pollution prevention plan developed in accordance with **ATTACHMENT A**.

18. Information required by the 316(b) Phase II regulations, 40 CFR Part 125.95 et seq., shall be submitted to KDHE - Bureau of Water in accordance with the dates indicated in the Phase II regulations.

ATTACHMENT A

STORM WATER POLLUTION PREVENTION PLAN REQUIREMENTS AND GUIDELINES

The Storm water Pollution Prevention plan (SWP2 plan) shall be specific to the industrial activities and site characteristics occurring at the location described in this permit. The permittee shall fully implement the provisions of the SWP2 plan required under this permit as a condition of this permit.

The purpose of the SWP2 plan is to ensure the design, implementation, management, and maintenance of Best Management Practices (BMPs) in order to reduce the amount of pollutants in storm water discharges associated with the industrial activities at the facility. The SWP2 plan shall evaluate BMPs from each of three major classes: managerial/administrative; structural controls and non-structural controls.

The permittee shall evaluate, select, install, utilize, operate and maintain the BMPs in accordance with the concepts and methods described in Environmental Protection Agency (EPA) document number EPA 832-R-92-006, entitled ***Storm water Management for Industrial Activities*** *- Developing Pollution Prevention Plans and Best Management Practices*, published in September, 1992[1]; and the U.S. Environmental Protection Agency's *Final NPDES Storm Water Multi-Sector General Permit for Industrial Activities*; Notice dated Sept. 29, 1995, and subsequent modifications.

The SWP2 plan and any amendments shall be prepared by, or under the supervision of, and sealed by a Kansas licensed professional engineer. The SWP2 plan shall be reviewed and re-certified for compliance with accepted engineering standards for storm water pollution prevention at least once every five years. The plan shall contain, at a minimum, the following items:

1. Pollution Prevention Team - Specific individuals shall be identified within the facility organization as members of a Storm water Pollution Prevention Team who are responsible for developing, implementing, maintaining and revising the plan. Each member's responsibilities shall be clearly identified in the plan. The activities and responsibilities of the team shall address all aspects of the facility's storm water pollution prevention plan.

2. Description of potential pollutant sources - pollutant sources which may reasonably be expected to add significant amounts of pollutants to the storm water discharge shall be described. The description shall include, at a minimum:

    a. Site Map - a site map identifying: the outline drainage areas of each storm water outfall; the location of significant materials exposed to precipitation; storage tanks; scrap yards and general refuse areas; fuel storage and distribution areas; vehicle and equipment maintenance and storage areas; loading/unloading areas; waste treatment, storage or disposal areas; short and long term material storage areas (including but not limited to: supplies, construction materials, plant equipment, oils, fuels, used and unused solvents, cleaning materials, paint, water treatment chemicals, fertilizers, and pesticides); landfills; construction sites; stock piles; major spills or leaks; surface water bodies and existing structural control measures to reduce pollutants in storm water runoff (such as bermed areas, grassy swales, etc.).

    b. Inventory of Exposed Materials - a narrative description of significant materials handled, treated, stored, leaked, spilled or disposed of in a manner to allow exposure to storm water within the period starting three years prior to the date of this permit; existing structural and nonstructural control measures to reduce pollutants in storm water runoff; and any treatment the storm water receives. A list of significant spills and leaks of toxic / hazardous materials in exposed areas shall be maintained and kept updated.

    c. Sampling Data - a summary of existing sampling data.

    d. Risk Identification and Summary of Potential Pollutant Sources - A narrative description of the potential pollutant sources and pollutant parameter of concern shall be identified.

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[1]The EPA Manual entitled ***Storm water Management for Industrial Activities*** *- Developing Pollution Prevention Plans and Best Management Practices*, and the *Final NPDES Storm Water Multi-Sector General Permit for Industrial Activities*; Notice dated Sept. 29, 1995 are available through the EPA Water Resources Center, at (202) 260-7786, e-mail waterpubs@epamail.epa.gov or the National Technical Information Services (NTIS). The NTIS publication number is PB92-235969. The NTIS order desk phone number is (800) 553-6847.

3. Measures and Controls - A description of storm water management controls appropriate for the facility which addresses the following minimum components, including a schedule for implementing such controls to the extent practical:

   a. Good housekeeping requiring the maintenance of areas in a clean, orderly manner including handling and storage areas (exposed to precipitation) for raw metals, scrap metals, fines, paints and other process areas.

   b. Preventive Maintenance - Including timely inspection and maintenance of storm water management devices, like oil water separators, catch basins etc.

   c. Spill Prevention and Response Procedures - Appropriate material handling procedure, storage requirements, use of equipment such as diversion valves, and procedures for cleaning up spills should be identified. Availability of the necessary equipment to implement a clean up should be addressed. The following areas should be addressed:

      (1) Metal fabrication and finishing areas - include measures for maintaining clean, dry, orderly conditions and use of dry clean-up techniques;

      (2) Receiving, Unloading and Storage Areas and Raw Material Storage Areas - include measures to prevent spills & leaks; easy access for spill clean-up; quick and correct identification of materials; and train employees on clean-up techniques.

      (3) Storage of Equipment - include procedures for proper clean-up and/or covering of equipment before storing outdoors.

      (4) Storage of Metal Working Fluids - measures to identify proper controls.

      (5) Cleaners and Rinse Water - Include measures to control spills, build-up and disbursement of sand from sand blasting, and use of less toxic cleaners.

      (6) Lubricating Oils and Hydraulic Fluids - include procedures for using detecting and control devices to reduce, prevent, and contain leaks and overflows.

      (7) Chemical Storage Areas - include a program to inspect containers, and identify proper disposal and spill controls to prevent storm water contamination.

   d. Inspections: Identification of qualified facility personnel to inspect at appropriate intervals designated equipment and storage areas for raw metal, finished product, materials and chemicals, recycling, equipment, paint, fueling and maintenance; and loading, unloading, and waste management areas. A set of tracking or follow-up procedures shall be used to ensure that appropriate actions are taken in response to the inspections. Records of inspections shall be maintained on-site for at least three years after the date of the inspection.

   e. Employee Training: Employee training programs to inform personnel responsible for implementing activities identified in the storm water pollution prevention plan or otherwise responsible for storm water management, at all levels of responsibility, of the components and goals of the storm water pollution prevention plan. The pollution prevention plan shall consider periodic dates for such training, but in all cases training must be held at least annually.

   f. Record keeping and Internal Reporting Procedures: A log to document a description of incidents (such as spills, or other discharges), along with other information which may impact the quality and quantity of storm water discharges needs to be developed and maintained. Reporting procedures, inspections and maintenance activities shall be developed and included in the SWP3 plan.

   g. Non-storm water Discharges -include a certification that the discharge has been tested or evaluated for the presence of dry weather flows. The certification should include all potential significant sources of dry weather flows, all analytical data for quality and quantity of such flows, and signature of the authorized person. The plan shall identify and ensure the implementation of appropriate pollution prevention measures for the dry weather flow component(s) of the discharge.

   h. Sediment and Erosion Control: Measures to minimize erosion in areas which, due to topography,

activities, or other factors, have a high potential for significant soil erosion. At a minimum consider structural, vegetative, and/or stabilization measures to limit erosion. Must include measures to minimize erosion related to the high volume of traffic from heavy equipment for delivery to and from the facility and for equipment operating at the facility on a daily basis such as forklifts, cranes etc.

i. Management of Runoff: Describe and consider the appropriateness of traditional storm water management practices (practices other than those which control the generation or source(s) of pollutants) to divert, infiltrate, reuse or otherwise manage storm water runoff in a manner that reduces pollutants in storm water discharges from the site. Include that the measures that the permittee determines to be reasonable and appropriate should be implemented and maintained. The potential of various sources at the facility to contribute pollutants to storm water discharges associated with industrial activity (see Item 3.c) shall be considered when determining reasonable and appropriate measures to implement.

4. Comprehensive Site Compliance Evaluation - Qualified personnel shall conduct site compliance evaluations at least once a year. Such evaluations shall provide for:

a. Visual inspection of areas contributing to a storm water discharge associated with industrial activity for evidence of, or the potential for, pollutants entering the drainage system. Evaluation of measures to reduce pollutant loadings to determine whether they are adequate and properly implemented in accordance with the terms of the permit or whether additional control measures are needed. A visual evaluation of equipment needed to implement the plan, such as spill response equipment and containment drums, shall be made to determine it is functioning properly and drums are not corroded.

b. A report summarizing the scope of the evaluation, personnel making the evaluation, the date(s) of the evaluation, major observations relating to the implementation of the storm water pollution prevention plan, and any actions taken shall be made and retained as part of the storm water pollution prevention plan. Where a report does not identify any incidents of noncompliance, a certification that the facility is in compliance with the storm water pollution prevention plan and this permit needs to be included in the plan.

5. Monitoring and Record Keeping Requirements.

a. Visual Examination of Storm Water Quality: The permittee shall perform and document at least one visual examination of a storm water discharge associated with industrial activity from each identified storm water outfall. Visual examination reports shall be maintained in the plan. Each report shall include the date and time, name of the person performing examination, nature of discharge (runoff or snow melt), visual quality of the discharge (i.e., color, odor, clarity, floating solids, suspended solids, foam, oil sheen, and other indicators of storm water pollution) and probable sources of any observed contamination.

b. To ensure the adequacy of the best management practices developed within the SWP2 plan, the permittee needs to periodically monitor[2] the storm water discharges during wet weather events for potential contaminants which may reasonably be expected to be present in the discharge. Record of all storm water monitoring reports, unless otherwise indicated in this permit, shall be kept on file.

6. The plan shall be re-evaluated and modified in a timely manner, but in no case more than 12 weeks after:

a. a change in design, construction, operation or maintenance that has a significant effect on the potential for the discharge of pollutants to the waters of the State, or

b. the permittee's inspections (including the regular comprehensive site compliance evaluation required herein) indicate deficiencies in the SWP2 plan or any BMP; or

c. a visual inspection of contributing areas or a visual inspection of the storm water discharges or monitoring of the storm water discharges indicate the plan appears to be ineffective in eliminating or significantly minimizing pollutants from sources identified in the plan.

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[2] For sampling methods and procedures please refer to ***NPDES STORM WATER SAMPLING GUIDANCE DOCUMENT, EPA 833-B-92-001***. This document can be obtained by calling (202) 564-0746 or the National Technical Information Service (NTIS) at (800) 553-6847.

15. Permit Modifications and Terminations: As provided by KAR 28-16-62, after notice and opportunity for a hearing, this permit may be modified, suspended or revoked or terminated in whole or in part during its term for cause as provided, but not limited to those set forth in KAR 28-16-62 and KAR 28-16-28b through f. The permittee shall furnish to the Director, within a reasonable amount of time, any information which the Director may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit or to determine compliance with this permit. The permittee shall also furnish upon request, copies of all records required to be kept by this permit.

16. Toxic Pollutants: Notwithstanding paragraph 15 above, if a toxic effluent standard or prohibition (including any schedule of compliance specified at such effluent standards) is established under 33 USC Section 1317(a) for a toxic pollutant which is present in the discharge and such standard or prohibition is more stringent than any limitation for such pollutant in this permit, this permit shall be revised or modified in accordance with the toxic effluent standard or prohibition. Nothing in this permit relieves the permittee from complying with federal toxic effluent standards as promulgated pursuant to 33 USC Section 1317.

17. Civil and Criminal Liability: Except as authorized in paragraph 9 above, nothing in this permit shall be construed to relieve the permittee from civil or criminal penalties for noncompliance as provided for in KSA 65-170d, KSA 65-167, and 33 USC Section 1319.

18. Oil and Hazardous Substance Liability: Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities or penalties to which the permittee is or may be subject to under 33 USC Section 1321 or KSA 65-164 et seq. The municipal permittee shall promptly notify the Division by telephone upon discovering crude oil or any petroleum derivative in its sewer system or wastewater treatment facilities.

19. Industrial Users: The municipal permittee shall require any industrial user of the treatment works to comply with 33 USC Section 1317, 1318 and any industrial user of storm sewers to comply with 33 USC Section 1308.

20. Property Rights: The issuance of this permit does not convey any property rights in either real or personal property, or any exclusive privileges, nor does it authorize any injury to private property or any invasion of personal rights nor any infringements of or violation of federal, state or local laws or regulations.

21. Operator Certification: The permittee shall ensure the wastewater facilities are under the supervision of an operator certified by the Department. If the permittee does not have a certified operator or loses its certified operator, appropriate steps shall be taken to obtain a certified operator as required by KAR 28-16-30 et seq.

22. Severability: The provisions of this permit are severable. If any provision of this permit or any circumstance is held invalid, the application of such provision to other circumstances and the remainder of the permit shall not be affected thereby.

23. Removal from Service: The permittee shall inform the Division at least three months before a pumping station, treatment unit, or any other part of the treatment facility permitted by this permit is to be removed from service and shall make arrangements acceptable to the Division to decommission the facility or part of the facility being removed from service such that the public health and waters of the state are protected.

24. Duty to Reapply: A permit holder wishing to continue any activity regulated by this permit after the expiration date, must apply for a new permit at least 180 days prior to expiration of the permit.

STANDARD CONDITIONS FOR
KANSAS WATER POLLUTION CONTROL AND
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM PERMIT

1. Representative Sampling:

   A. Samples and measurements taken as required herein shall be representative of the nature and volume of the monitored discharge. All samples shall be taken at the location designated in this permit, and unless specified, at the outfall(s) before the effluent joins or is diluted by any other water or substance.

   B. Monitoring results shall be recorded and reported on forms acceptable to the Division and postmarked no later than the 28th day of the month following the completed reporting period. Signed and certified copies of these, prepared in accordance with KAR 28-16-59 and all other reports required herein, shall be submitted to:

      Kansas Department of Health & Environment
      Bureau of Water-Technical Services Section
      1000 SW Jackson Street, Suite 420
      Topeka, KS 66612-1367

2. Schedule of Compliance: No later than 14 calendar days following each date identified in the "Schedule of Compliance," the permittee shall submit to the above address, either a report of progress or, in the case of specific action being required by identified dates, a written notice of compliance or noncompliance. In the latter case, the notice shall include the cause of noncompliance, any remedial actions taken, and the probability of meeting the next scheduled requirements, or, if there are no more scheduled requirements, when such noncompliance will be corrected.

3. Definitions:

   A. The "daily average" discharge means either the total discharge by weight during a calendar month divided by the number of days in the month that the facility was operating or the average concentration for the month. The daily average discharge shall be determined by the summation of all measured daily discharges by weight divided by the number of days during the calendar month when the measurements were made, or by the summation of all concentrations determined during the calendar month divided by the number of samples collected and analyzed.

   B. The "daily maximum" discharge means the total discharge by weight or average concentration during a 24 hour period.

   C. The "monthly average", other than for fecal coliform bacteria, is the arithmetic mean of the value of effluent samples collected in a period of 30 consecutive days. The monthly average for fecal coliform bacteria is the geometric mean of the value of the effluent samples collected in a period of 30 consecutive days.

   D. The "weekly average", other than for fecal coliform bacteria, is the arithmetic mean of the value of effluent samples collected in a period of 7 consecutive days. The weekly average for fecal coliform bacteria is the geometric mean of the value of effluent samples collected in a period of 7 consecutive days.

   E. A "grab sample" is an individual sample collected in less than 15 minutes.

F. A "composite sample" is a combination of individual samples in which the volume of each individual sample is proportional to the discharge flow, the sample frequency is proportioned to the flow rate over the sample period, or the sample frequency is proportional to time.

G. The "act" means the Clean Water Act, 30 USC Section 1251 et seq.

H. The terms "Director", "Division", and "Department" refer to the Director, Division of Environment, Kansas Department of Health and Environment, respectively.

I. "Severe property damage" means substantial physical damage to property, damage to the treatment facilities which causes them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.

J. "Bypass" means any diversion of waste streams from any portion of a treatment facility or collection syste

4. Test Procedures: All analysis required by this permit shall conform to the requirements of 33 USC Section 1314(h), and shall be conducted in a laboratory certified by this Department. For each measurement or sample, the permittee shall record the exact place, date, and time of sampling; the date of the analyses, the analytical techniques or methods used, and the individual(s) who performed the sampling and analysis and, the results. If the permittee monitors any pollutant at the location(s) designated herein more frequently than required by this permit, using approved procedures, the results shall be included in the Discharge Monitoring Report form required in 1.B. above. Such increased frequencies shall also be indicated.

5. Records Retention: All records and information resulting from the monitoring activities required by this permit, including all records of analyses and calibration and maintenance of instrumentation and recordings from continuous monitoring instrumentation, shall be retained for a minimum of 3 years, or longer if requested by the Division.

6. Change in Discharge: All discharges authorized herein shall be consistent with the terms and conditions of this permit. The discharge of any pollutant not authorized by this permit or of any pollutant identified in this permit more frequently than or at a level in excess of that authorized shall constitute a violation of this permit. Any anticipated facility expansions, productions or flow increases, or process modifications which result in a new, different, or increased discharge of pollutants shall be reported to the Division at least one hundred eighty (180) days before such chang

7. Noncompliance Notifications: If for any reason, the permittee does not comply with, or will be unable to comply with any daily maximum or weekly average effluent limitations specified in this permit, the permittee shall provide the Department with the following information in writing within five days of becoming aware of such condition:

   A. A description of the discharge and cause of noncompliance, and

   B. the period of noncompliance including exact dates and times or if not corrected, the anticipated time the noncompliance is expected to continue and steps taken to reduce, eliminate and prevent recurrence of the noncomplying discharge.

   The above information shall be provided with the submittal of the regular Discharge Monitoring Report form for violations of daily average or monthly average effluent limitations.

3. Facilities Operation: The permittee shall at all times maintain in good working order and efficiently and effectively operate all treatment, collection, control systems or facilities, to achieve compliance with the terms of this permit. Such proper operation and maintenance procedures shall also include adequate laboratory controls and appropriate quality assurance procedures. Maintenance of treatment facilities which results in degradation of effluent quality, even though not causing violations of effluent limitations shall be scheduled during noncritical water quality periods and shall be carried out in a manner approved in advance by the Division. The permittee shall take all necessary steps to minimize or prevent any adverse impact to waters of the State resulting from noncompliance with any effluent limitations specified in this permit, including such accelerated or additional monitoring as necessary to determine the nature and impact of the noncomplying discharge. When necessary to maintain compliance with the permit conditions, the permittee shall halt or reduce those activities under its control which generate wastewater routed to this facility.

3. Immediate Reporting Required: Any diversion from, or bypass of facilities necessary to maintain compliance with the permit is prohibited, except: where no feasible alternatives to the bypass exist and 1) where necessary to prevent loss of human life, personal injury or severe property damage; or 2) where excessive stormwater inflow or infiltration would damage any facilities necessary to comply with this permit or 3) where the permittee notifies the Director seven days in advance of an anticipated bypass. The Director or Director's designee may approve a bypass, after considering its adverse effects, if any of the three conditions listed above are met. The permittee shall immediately notify the Division by telephone [(913) 296-5517 or the appropriate KDHE District Office] of each bypass and shall confirm the telephone notification with a letter explaining what caused this spill or bypass and what actions have been taken to prevent recurrence. Written notification shall be provided to the Director within five days of the permittee becoming aware of the bypass. The Director or Director's designee may waive the written report on a case-by-case basis.

0. Removed Substances: Solids, sludges, filter backwash, or other pollutants removed in the course of treatment or control of wastewaters shall be disposed of in a manner acceptable to the Division.

1. Power Failures: The permittee shall provide an alternative power source sufficient to operate the wastewater control facilities or otherwise control pollution and all discharges upon the loss of the primary source of power to the wastewater control facilities.

2. Right of Entry: The permittee shall allow authorized representatives of the Division of Environment or the Environmental Protection Agency upon the presentation of credentials, to enter upon the permittee's premises where an effluent source is located, or in which are located any records required by this permit, and at reasonable times, to have access to and copy any records required by this permit, to inspect any monitoring equipment or monitoring method required in this permit, and to sample any influents to, discharges from or materials in the wastewater facilities.

3. Transfer of Ownership: The permittee shall notify the succeeding owner or controlling person of the existence of this permit by certified letter, a copy of which shall be forwarded to the Division. The succeeding owner shall secure a new permit. The permit is not transferable to any person except after notice and approval by the Director. The Director may require modification or revocation and reissuance of the permit to change the name of the permittee and incorporate such other requirements as may be necessary.

4. Availability of Records: Except for data determined to be confidential under 33 USC Section 1318, all reports prepared in accordance with the terms of this permit shall be available for public inspection at the offices of the Department. Effluent data shall not be considered confidential. Knowingly making any false statement on any such report or tampering with equipment to falsify data may result in the imposition of criminal penalties as provided for in 33 USC Section 1319 and KSA 65-170c.

LACYGNE LANDFILL
EMERGENCY RESPONSE ACTION PLAN

KANSAS CITY POWER & LIGHT COMPANY
LACYGNE GENERATING STATION
25166 E 2200 ROAD
LACYGNE, KANSAS 66040

August, 2010

Prepared by
KANSAS CITY POWER & LIGHT
ENVIRONMENTAL SERVICES

LACYGNE GENERATING STATION
LANDFILL EMERGENCY RESPONSE ACTION PLAN

This Landfill Emergency Response Action Plan (LERAP) for the Kansas City Power and Light (KCP&L) LaCygne Generating Station Landfill in LaCygne, Kansas, has been prepared for easy access by response personnel during an actual emergency or spill.

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LANDFILL EMERGENCY RESPONSE ACTION PLAN

LANDFILL EMERGENCY RESPONSE ACTION PLAN

1. Emergency Coordinator Information

The Emergency Coordinator is the LaCygne Environmental Compliance Administrator (ECA), who is responsible for addressing spills at the Station. The Qualified Individual has full authority to implement the LERAP.

Name: Ms. Theresa Goin
Position: ECA – LaCygne Generating Station
Facility Address: 25166 E 2200 Road, LaCygne, Kansas 66040
Emergency Telephone Number (Facility): (913) 402-4136
Emergency Telephone Number (Cell): (816) 517-9274

2. Emergency Notification Telephone List

The emergency notification telephone list identifies and prioritizes the names and telephone number of the organizations and personnel that may need to be notified immediately in the event of a spill emergency The ECA or other qualified individual will decide notification.

Organization	Phone Number
1. 1. National Response Center (NRC):	(800) 424-8802
2. 2. U.S. EPA – Region 7	(913) 281-0991
3. Kansas Department of Health and Environment (KDHE)	(785) 249-1429
KDHE Evening Phone:	(785) 231-2759

Emergency Coordinator – Ms. Theresa Goin, Environmental Compliance Administrator
Office (LaCygne Generating Station): (913) 402-4136
Evening Phone: (816) 517-9274

Other Numbers

1. Kansas City Power & Light Company – Environmental Services
   Corporate Office – John Horn : (816) 556-2007
2. Linn County Fire-Rural District No.1 – LaCygne, Kansas: (913) 352-6480
3. 911
4. Sheriff's Department – Linn County, Kansas: (913) 795-2666
5. Kansas Highway Patrol, Troop H, Chanute, Kansas: (620) 431-2100
6. Linn Country Local Emergency Planning Committee: (913) 352-6480
7. Local Weather Report (Nat'l Weather Office) (800) 438-0596

Hospitals

1. Fort Scott Mercy, Fort Scott KS: (620) 223-2200
2. Miami Co. Medical Center, Paola KS (913) 294-2327 ER (913) 294-6655
3. Bates County Memorial, Butler MO (660) 679-4135

3. Spill Response Notification Form

Below is a checklist of information that will be provided to the applicable response agencies and personnel in case of a reportable spill:

Person Reporting Spill _____

Title/Position:_____

Telephone Numbers: Day (913) 402-4136

Evening _(913) 632-0833/0834 (24 hour emergency number)_____

Company: Kansas City Power & Light Company

Organization Type: LaCygne Generating Station

Address: 25166 E 2200 Road, LaCygne, Kansas 66040

Facility Latitude: Degrees: 38 Minutes: 20 Seconds: 48

Facility Longitude: Degrees: 94 Minutes: 38 Seconds: 30

INCIDENT DESCRIPTION

Were Materials Discharged?_____(Y/N) Confidential?_____(Y/N)

Meeting Federal Obligations to Report?_____(Y/N) Date Called:_____

Calling for Responsible Party?_____(Y/N) Time Called:_____

Source and/or Cause of Incident:_____

_____

Date of Incident:_____

Time of Incident:_____AM/PM

Incident Address/Location:_____

Nearest City: LaCygne State: KS County: Linn Zip: 66040

Distance from City (Miles): 7 Direction from City: East

Section: SE ¼ 33 Township: 19 S Range: 25 E

MATERIAL SPILLED

Product	Discharged quantity	Unit of Measure

3. Spill Response Notification Form, Continued

RESPONSE ACTION

Actions Taken to Correct, Control or Mitigate Spill Incident:

_____

_____

_____

IMPACT

Number of Injuries:_____Number of Deaths:_____

Were there Evacuations?_____(Y/N) Number Evacuated:_____

Was there any Damage?_____(Y/N)

Damage in Dollars (approximate):_____

Medium Affected:_____

Description:_____

More information about Medium:_____

_____

ADDITIONAL INFORMATION

Any information about the incident not recorded elsewhere in the report:

_____

_____

_____

_____

Sky (Sunny/cloudy, etc.): _____

_____

Wind Speed and Direction: _____

_____

_____

_____

_____

_____

_____

CALLER NOTIFICATIONS

EPA?_____(Y/N) State of Kansas - KDHE?

_____(Y/N)

WEATHER INFORMATION

Temperature: _____

_____

4. Response Equipment

On site heavy equipment contractors are available through the shift foreman for spill response on a 24 hour basis. Assessment of the situation will dictate what equipment is needed.

5. Facility Response Team

The facility response team includes designated LaCygne Station personnel, designated KCPL employees in the Environmental Services office in Kansas City, Missouri, and Emergency Spill Contractors who are under contract to the facility for response activities.

Date of last update: August 2010

Coordinator	Response time (minutes)	Phone (day/evening)
1. On Duty Shift Foreman	at LaCygne Facility 5 min	20833/20834 (Internal)
2. Theresa Goin Qualified Individual	when at facility 5 minutes from home 60 Minutes	Plant - (913) 402-4136 Cell (816) 517-9274
3. John Horn– KCPL Environmental Services Spills	1-2.0 Hours	(Office) (816) 556-2007 (Cell) (913-449-0553 Evening (913) 894-5654
4. Bob Beck-KCPL Environmental Services NPDES Issues	1-2.0 Hours	(Office) (816) 654-1767 (Cell) (816) 665-9442 Evening (816) 524-5980

6. Evacuation Plan and Traffic Plan

Due to the nature of possible landfill failures, it is not expected that any evacuation will be needed. Even if the entire contents of the impoundments were to go into the lake, the water level would not rise enough to overtop the dam or cause shoreline flooding.

Berm failure of the impoundments could cause plant traffic to be rerouted. Response equipment could also block roads around the landfill. The reroute would be the responsibility of plant operations.

7. Immediate Actions in Case of a Spill

In case of a spill, the following immediate actions will be conducted to ensure the safety of the facility and to mitigate or prevent discharges. The Shift Foreman will notify the Qualified Individual who will initiate the actions on the Immediate Action Flowchart including calls to contractors. The Qualified Individual may rely upon the KCPL operators and staff at the Station or the central dispatch to make the calls.

In the event of a discharge the Facility Response Team will be mobilized. Additional spill response contractors will be contacted for mobilization on site, as needed.

Initial response to a breach in the impoundment berms would be to lower the water level in the impoundment. Isolate the breached pond and redirect process water from entering the damaged section. The emergency spillway in the berm may need to be opened to lower the water level if that will lessen the water pressure at the breach. Steps to stop water flow out of the impoundment can include stopping up the breach with soil or dry landfill material.

Solid material may flow out of a breached impoundment. Water flow will carry suspended particles eroded from the fill material so stopping the water flow as soon as possible is imperative. The consolidated solids in the impoundments could slump through a breach to fan out into a delta outside the breach. This material should be picked up and hauled to the dry landfill when dewatered.

If a berm begins to show signs of imminent failure, the initial response should be to remove as much water from that impoundment as possible. The berm should be reinforced from outside with compacted fill material until a thorough engineering study can be made to determine a permanent repair.

Any unusual soil movement on the outer slopes of the berm should be reported to the Emergency Coordinator immediately.

8. LANDFILL SPILL RESPONSE
IMMEDIATE ACTION FLOW CHART

WHEN SPILL OBSERVED

CONTACTS

↓

CONTACT SHIFT FOREMAN

↓

Shift foreman contacts ECA or the Ops. Superintendent, if the ECA is unavailable to fill the role of Emergency Coordinator.

↓

Determine if the spill violates applicable water quality standards (40 CFR 110.11)

↓

Is a sludge or emulsion deposited beneath the surface of the lake?

↓

If YES

↓

The Emergency Coordinator will make the required regulatory notifications

↓

IF NO

↓

No notification necessary

OPERATIONS

↓

STOP SOURCE OF SPILL

↓

Is a contractor necessary?

↓

IF YES

↓

Emergency Coordinator will contact contractor and utilize available KCPL personnel to reduce release.

↓

IF NO

↓

Emergency Coordinator will utilize KCPL personnel to stop release and begin cleanup

↓

Contain spill to land; prevent contact with water where possible

↓

Stabilize berms where necessary and fill breach.

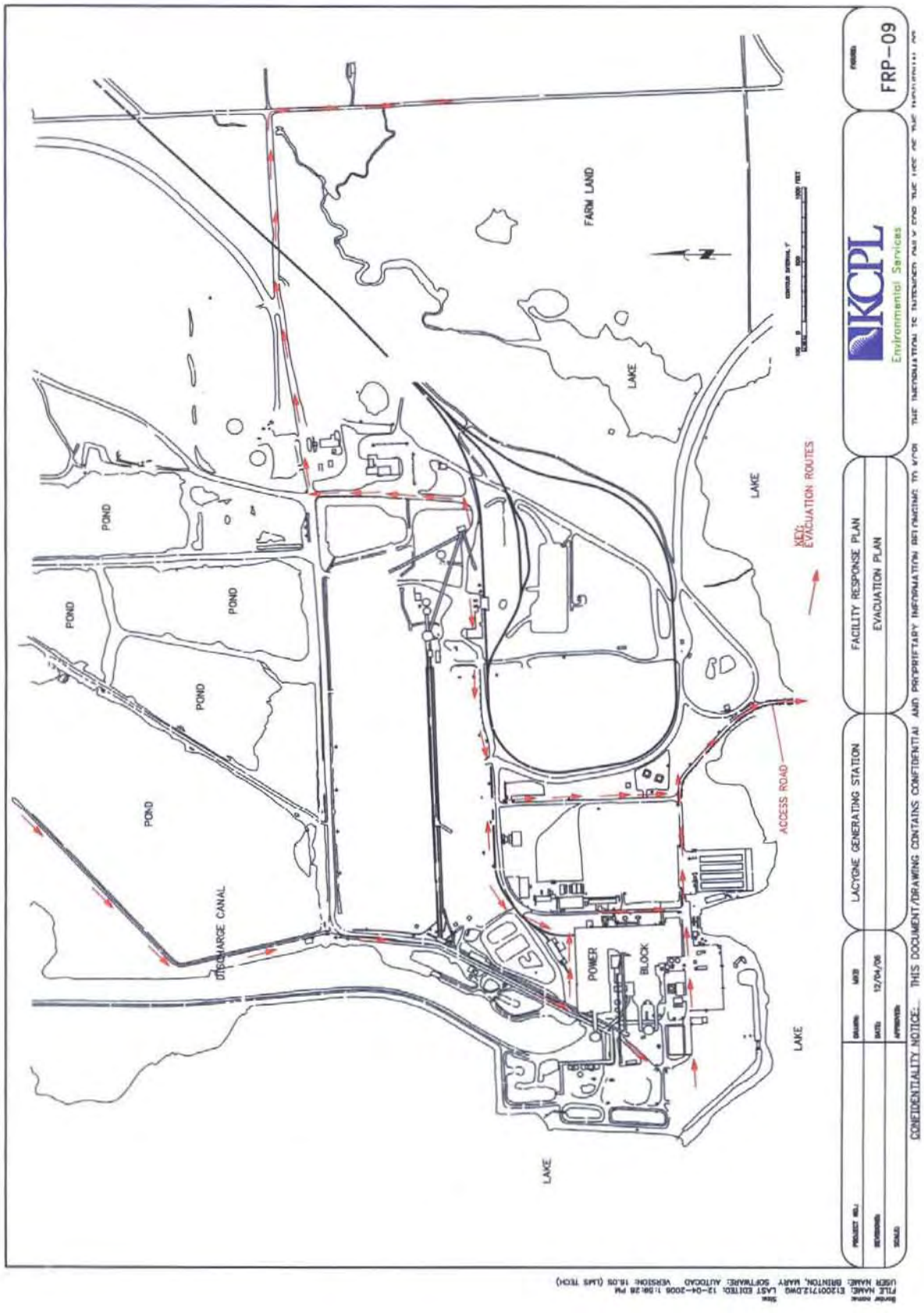
↓

Complete cleanup and restore impoundments to safe condition

↓

Any regulatory follow-up reports will be drafted by the ECA for review and submittal by Environmental Services

9. Facility Map



URS

September 15, 2009
URS Project 16530488

Mr. Paul Ling
Kansas City Power & Light
P.O. Box 418679
Kansas City, Missouri 64141-9679

Re: Safe Water Level Study
Upper AQC Pond
La Cygne Power Generation Station
La Cygne, Kansas

Dear Mr. Ling:

Transmitted with this letter is URS Corporation's report on analyses made to evaluate safe operating water levels within the Upper AQC Pond at the referenced site. Keeping water levels at or below the safe water levels identified in our report allow the pond to store precipitation from the design storm and maintain a freeboard of one foot.

We appreciate the opportunity to work with you on this project. If you have any questions regarding this report, please call.

Very truly yours,
URS Corporation

L. Todd Bond, P.E.
Project Engineer

Brian D. Linnan, P.E.
Project Manager

BRIAN D. LINNAN
LICENSED
10810
KANSAS
PROFESSIONAL ENGINEER

URS Corporation
8300 College Boulevard
Suite 200
Overland Park, KS 66210
Tel: 913.344.1000
Fax: 913.344.1011

SAFE WATER LEVEL STUDY
UPPER AQC POND
KCP&L LA CYGNE POWER GENERATION STATION
LA CYGNE, KANSAS

Prepared for
Kansas City Power & Light
P.O. Box 418679
Kansas City, Missouri 64141-9679

September 2009

URS Corporation
8300 College Boulevard
Suite 200
Overland Park, Kansas 66210

Project No. 16530488

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The purpose of this study is to evaluate the maximum safe operation water level in the Upper AQC while maintaining a reserve storage capacity to retain the design storm event and maintain a minimum freeboard of one foot.

The U.S. Army Corps of Engineers HEC-HMS computer software was used in the preparation of this report. The following assumptions are made:

- At the time of the rainfall event, all of pond basins will either be inundated with standing water or any exposed ground will be saturated.
- At the time of the rainfall event, all interconnected pond basins are at their maximum safe water elevation.
- SCS curve number of 98 was used in the modeling calculations to establish peak runoff and total volume runoff quantities.
- Manning's n used in time of concentration calculations is 0.45 (sheet flow).
- Minimum freeboard of one foot.
- All stormwater will be contained on site, no release from the pond.
- The water surface elevations of all hydraulically connected pond basin will equalize prior to any evapotranspiration losses.
- 25-Year, 24-Hour design storm, Type II SCS storm, 6.4-inch rainfall per TR-55, Second Ed., June 1986.

The Upper AQC Pond was divided into nine basins for analysis. The basins were delineated based on the existing placement of dikes, control structures and interconnecting drainage pipes. A table of basins and storage capacity calculations is included in Table 1.

The access road surrounding the basins is at a nearly constant elevation of 890 feet. The access road is elevated above the surrounding areas; consequently, no offsite stormwater enters the pond basins.

3.1 BASIN A

Basin A is used for evapotranspiration. The discharge point for Basin A is Basin I. Excess waste is carried to Basin I via two, 18-inch diameter steel pipes. The upstream flowlines for these pipes are approximately 888.5 feet. These pipes are capable of conveying flows during the lower intensity storms. During high intensity storms, the excess stormwater will over top the internal berm between Basin A and Basin B at the north end of Basin A and flow to Basins B and ultimately into Basin D.

3.2 BASINS B AND C

Basins A and B are used for evapotranspiration of excess water. Water is pumped from the Lower AQC Pond to Basins B and C and allowed to cover the basin with shallow standing water.

The basins A and B are separated by a dike with an opening in the dike to allow free movement of water from one to the other. Hydraulically, Basins B and C operate as a single basin. Excess stormwater from these basins flows to Basin D.

3.3 BASIN D

Basin D is heavily vegetated in the upper reach of the basin. The majority of the basins are either bare ash or standing water, both conditions were modeled using a SCS Curve Number of 98. Release from Basin D is controlled by a broad crested weir located along the southern dike of the basin. The low elevation of the weir is approximately 888 feet. A low flow weir is incorporated into the weir. This low flow weir is approximately 14 feet in width and 0.4 feet in depth. For purposes of modeling, that weir was modeled at an elevation of 888 feet to evaluate the storage capacity of the basin. Overflow from Basin D is captured in Basin E.

3.4 BASINS E THROUGH G

Basin F is the receiving basin for the ash effluent from the plant. All three basins are void of vegetation and hydraulically connected by discontinuities in the dike separating the basins. The hydraulic sequence of these basins is as follows:

1. Effluent is pumped to Basin F.

2. Effluent is conveyed to Basin E through a low area in the dike separating Basins F and E.

3. The effluent is conveyed to Basin G by another low area in the dike separating Basins E and G.

4. Basin H is hydraulically connected to Basin G by four, 18-inch diameter steel pipes. The flowlines of these pipes are approximately 10 feet below the elevation of the dike and remain submerged most of the time.

5. An inlet is located at the south side of the basin. This inlet can be used to recycle water from Basin H back to the power plant. This point is hydraulically the farthest point from the effluent discharge point in Basin F.

An emergency spillway is located at the southern end of Basin F. The original construction plans indicate the spillway is broad crested weir 50 feet in length measured along the bottom. Side slopes from the bottom to the top of the dike are 4H:1V. The flow line of the weir is 887.0 feet.

3.5 BASIN H

Basin H is hydraulically downstream from Basin G. Basin H is connected to Basin G by four, 18-inch diameter steel pipes. The pipes are submerged the majority of the time and allow the water levels to equalize between Basin H and Basins E-G. Basin I is upstream of Basin H. Basin I is very shallow. For the purposes of modeling, Basin I is assumed to have no storage capacity. Any stormwater captured by Basin I is carried to Basin H.

3.6 BASIN I

Basin I is downstream of Basin C. Basin I discharges to Basin H by two, 18-inch diameter steel pipes. The water surface elevation of Basin I is considerably higher than Basin H and above the established safe water elevation of Basins E-G and Basin H. Given the elevation of the water in the basin at the time of the survey, the basin was modeled as being nearly full and provided no storage capacity.

The U.S. Army Corps of Engineers HEC-HMS computer software was used to calculate the peak discharges and total volume of captured stormwater for each basin. A 25-year, 24-hour design storm of 6.5 inches of total precipitation was used in the model. The U.S. Department of Agriculture's TR-55 was used in determining the precipitation amount for Linn County, Kansas.

Time of concentration was calculated in accordance with the guidelines of TR-55 for sheet flow and shallow flows follows.

Sheet Flow:

$$T_t = \frac{0.007(nL)^{0.8}}{(P_2)^{0.5} s^{0.4}}$$

T_t = travel time (hr)

n = Manning's roughness coefficient (table 3-1)
L = flow length (ft)
P_2 = 2-year, 24-hour rainfall (in)
s = slope of hydraulic grade line (land slope, ft/ft)

Shallow Concentrated Flow (unpaved surfaces):

$$v = 16.1345(s)^{0.5}$$

v = velocity (ft/sec)

s = slope (ft/ft)

The time of concentration for those basin assumed to be inundated was set at 10 minutes. This is consistent with stormwater modeling for detention basins and other bodies of water as well. Calculations are summarized in Table 2.

Peak discharge and total volume for the individual basin was established using HEC-HMS. Table 3 summarizes the pertaining basin data as well as the resulting peak discharges and total volumes.

The procedures used in developing the safe water elevation are as follows:

1. The volume from Basin A and B are drained through Basin D.

2. The volume from Basin D is added to Basins A and B.

3. The deficit between the combined volumes and the available storage in Basin D is carried to Basin E via broad crested weir between Basins D and E.

4. Total volumes for Basins E-G are added to Basin D deficit to evaluate capacity required in Basins E-G.

5. Total volumes from Basin C, H & I are added to previous volumes to evaluate overall site storage requirements.

6. Combined storage volumes for Basins E-H are used to evaluate the maximum beginning water surface elevation based on as final water surface elevation of 886.0 feet.

7. Maximum safe water elevations are rounded to lower 0.5 feet increment.

Storage Determination Procedure

1	Volume from Basins A and B	59.1 ac-ft.	
2	Basin D Volume	13.3 ac-ft.	
	Combined Volume Basins A, B & D	72.4 ac-ft.	
	Basin D Storage @ 888.0	47.75 ac-ft.	
3	Basin D Storage Deficit	-24.65 ac-ft.	
	Total Volume Basins E-G	62.6 ac-ft.	
	Basin D Deficit	24.65 ac-ft.	
4	Req'd Capacity Basins E-G	87.25 ac-ft.	
	Total Volume Basins C, H & I	37.1 ac-ft.	
	Req'd Capacity Basins E-G	87.25 ac-ft.	
5	Total Site Storage Requirements	124.35 ac-ft.	
6	From Stage Storage Table for Combined Basins E-H and Req'd Vol = 124.35 ac-ft.		884.93 feet
7	**Set Safe Water Elevation at**		**884.5 feet**

Table 1
Basin Volume Calculations
Safe Water Level Study
Upper AQC Pond
La Cygne Power Generation Station

Basin A						
	Elev. (ft)	Area (sf)	Avg. Area (sf)	Inc. Storage (cf)	Cumm. Storage (cf)	Cumm. Storage (ac-ft)
	889	328,826.00				
	890	730,760.00	529,793	529,793	529,793	12.162
Basin B						
	Elev. (ft)	Area (sf)	Avg. Area (sf)	Inc. Storage (cf)	Cumm. Storage (cf)	Cumm. Storage (ac-ft)
	888	99,315				
	889	1,016,755	558,035	558,035	558,035	12.811
	890	2,354,138	1,685,447	1,685,447	2,243,482	51.503
Basin C						
	Elev. (ft)	Area (sf)	Avg. Area (sf)	Inc. Storage (cf)	Cumm. Storage (cf)	Cumm. Storage (ac-ft)
	889	2,595				
	890	2,354,138	1,178,367	1,178,367	1,178,367	27.052
Basin D						
	Elev. (ft)	Area (sf)	Avg. Area (sf)	Inc. Storage (cf)	Cumm. Storage (cf)	Cumm. Storage (ac-ft)
	883	109,497				0.000
	884	193,131	151,314	151,314	151,314	3.474
	885	311,917	252,524	252,524	403,838	9.271
	886	530,659	421,288	421,288	825,126	18.942
	887	886,284	708,471	708,471	1,533,598	35.207
	888	1,014,524	950,404	950,404	2,484,002	57.025
	889	1,030,683	1,022,604	1,022,604	3,506,605	80.501
	890	1,120,255	1,075,469	1,075,469	4,582,074	105.190
Basin E						
	Elev. (ft)	Area (sf)	Avg. Area (sf)	Inc. Storage (cf)	Cumm. Storage (cf)	Cumm. Storage (ac-ft)
	882	1,174,956				
	883	1,225,615	1,200,285	1,200,285	1,200,285	27.555
	884	1,264,972	1,245,293	1,245,293	2,445,579	56.143
	885	1,294,956	1,279,964	1,279,964	3,725,543	85.527
	886	1,311,657	1,303,307	1,303,307	5,028,850	115.447
	887	1,323,877	1,317,767	1,317,767	6,346,617	145.698
	888	1,334,624	1,329,251	1,329,251	7,675,868	176.214
	889	1,346,288	1,340,456	1,340,456	9,016,323	206.986
	890	1,455,632	1,400,960	1,400,960	10,417,283	239.148

Table 1
Basin Volume Calculations
Safe Water Level Study
Upper AQC Pond
La Cygne Power Generation Station
(Continued)

Basin F						
	Elev. (ft)	Area (sf)	Avg. Area (sf)	Inc. Storage (cf)	Cumm. Storage (cf)	Cumm. Storage (ac-ft)
	881	1,373,475				
	882	1,560,036	1,466,755	1,466,755	1,466,755	33.672
	883	1,734,311	1,647,173	1,647,173	3,113,929	71.486
	884	1,830,797	1,782,554	1,782,554	4,896,482	112.408
	885	1,994,934	1,912,865	1,912,865	6,809,348	156.321
	886	2,195,013	2,094,974	2,094,974	8,904,321	204.415
	887	2,436,912	2,315,963	2,315,963	11,220,284	257.582
	888	2,681,314	2,559,113	2,559,113	13,779,397	316.331
	889	2,708,169	2,694,742	2,694,742	16,474,139	378.194
	890	2,955,501	2,831,835	2,831,835	19,305,974	443.204

Basin G						
	Elev. (ft)	Area (sf)	Avg. Area (sf)	Inc. Storage (cf)	Cumm. Storage (cf)	Cumm. Storage (ac-ft)
	882	699,301				
	883	708,017	703,659	703,659	703,659	16.154
	884	713,917	710,967	710,967	1,414,626	32.475
	885	720,988	717,452	717,452	2,132,078	48.946
	886	728,179	724,584	724,584	2,856,661	65.580
	887	734,343	731,261	731,261	3,587,922	82.367
	888	750,840	742,592	742,592	4,330,514	99.415
	889	761,333	756,086	756,086	5,086,600	116.772
	890	818,586	789,960	789,960	5,876,560	134.907

Basin H						
	Elev. (ft)	Area (sf)	Avg. Area (sf)	Inc. Storage (cf)	Cumm. Storage (cf)	Cumm. Storage (ac-ft)
	880	809,135				
	881	841,957	825,546	825,546	825,546	18.952
	882	880,795	861,376	861,376	1,686,921	38.726
	883	913,747	897,271	897,271	2,584,192	59.325
	884	934,917	924,332	924,332	3,508,524	80.545
	885	952,361	943,639	943,639	4,452,163	102.208
	886	961,868	957,114	957,114	5,409,278	124.180
	887	970,534	966,201	966,201	6,375,479	146.361
	888	983,948	977,241	977,241	7,352,719	168.795
	889	996,437	990,192	990,192	8,342,912	191.527
	890	1,082,575.67	1,039,506	1,039,506	9,382,418	215.391

Table 1
Basin Volume Calculations
Safe Water Level Study
Upper AQC Pond
La Cygne Power Generation Station
(Continued)

Basin I						
	Elev. (ft)	Area (sf)	Avg. Area (sf)	Inc. Storage (cf)	Cumm. Storage (cf)	Cumm. Storage (ac-ft)
	886	33,939				
	887	180,125	107,032	107,032	107,032	2.457
	888	395,680	287,903	287,903	394,935	9.066
	889	428,657	412,168	412,168	807,103	18.529
	890	580,846	504,751	504,751	1,311,854	30.116

Table 2
Time of Concentration
Safe Water Level Study
Upper AQC Pond
La Cygne Power Generation Station

	Sheet Flow				Shallow Concentration					Total	
Drainage Area	Manning's n	Length (ft)	Slope (ft/ft)	T_{T1} (hrs)	Length (ft)	Slope (ft/ft)	Paved (y/n)	Velocity (ft/sec)	T_{T2} (hrs)	Time of Concentration $T_T=T_{T1}+T_{T2}+T_{T3}$(hrs)	Lag Time (min)
A	0.450	100	0.0013	1.09	3400	0.0012	n	0.56	1.69	2.78	100
B	0.450	100	0.0011	1.17	1050	0.0027	n	0.84	0.35	1.51	55
C	0.450	100	0.0014	1.06	1980	0.0014	n	0.60	0.91	1.97	71
D	0.450	100	0.005	0.64	900	0.005	n	1.14	0.22	0.86	31
E	Standing water in pond. Used Tc=10 min.									0.17	6
F	Standing water in pond. Used Tc=10 min.									0.17	6
G	Standing water in pond. Used Tc=10 min.									0.17	6
H	Standing water in pond. Used Tc=10 min.									0.17	6
I	Standing water in pond. Used Tc=10 min.									0.17	6

Table 3
Basin Summary Data
Safe Water Level Study
Upper AQC Pond
La Cygne Power Generation Station

Basin Summary Data									
Basin	Area (sf)	Area (ac)	T_C (hrs)	T_C (min)	CN	Q_{25} (cfs)	Volume (ac-ft)	Storage at Safe Water Elevation (ac-ft)	Safe Water Elevation (ft)
A	906,578	20.81	2.781	167	98	27.5	10.5	-	N/A
B	4,138,579.00	95.01	1.515	91	98	174.6	48.6	-	N/A
C	1,477,302.00	33.91	1.971	118	98	55.2	17.3	-	N/A
D	1,120,255.00	25.72	0.856	51	98	92.6	13.3	47.75	884.5
E	1,455,632.00	33.42	0.170	10	98	263.1	17.4	44.70	884.5
F	2,955,501.00	67.85	0.170	10	98	534.3	35.4	70.05	884.5
G	818,586.00	18.79	0.170	10	98	148.2	9.8	24.87	884.5
H	1,082,576.00	24.85	0.170	10	98	195.6	12.9	32.80	884.5
I	580,846.00	13.33	0.170	10	98	104.8	6.9	-	N/A
							172.1	220.17	

September 15, 2009 8:55.25 am (mik)
J:\KCPL La Cygne Upper AQC Pond\CAD\Plan Sheets\Basin Delineation.dwg

BROAD CRESTED WEIR (STRUCTURE #1)

OVER FLOW

BASIN D
SAFE WATER LEVEL
885

OVER FLOW

BASIN A
SAFE WATER LEVEL
= N/A

BROAD CRESTED WEIR (STRUCTURE #2)

BASIN E
SAFE WATER LEVEL
884.5

BASIN B
SAFE WATER LEVEL
= N/A

BASIN EQUALIZATION CHANNEL (MIN. FL= 877)

BASIN EQUALIZATION CHANNEL (MIN. FL= 888)

BASIN C
SAFE WATER LEVEL
= N/A

BASIN EQUALIZATION CHANNEL (MIN. FL= 877)

2 - 18" STEEL PIPES

BASIN G
SAFE WATER LEVEL
884.5

4 - 18" STEEL PIPES

BASIN F
SAFE WATER LEVEL
884.5

BROAD CRESTED WEIR (STRUCTURE #3)

2 - 18" STEEL PIPES

BASIN H
SAFE WATER LEVEL
884.5

SLURRY DISCHARGE POINT

BASIN EQUALIZATION CHANNEL (MIN. FL= 880)

BASIN I
SAFE WATER LEVEL = N/A

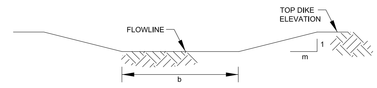
LOWER POND INLET

EMERGENCY SPILLWAY

18" STEEL PIPE

36" STEEL PIPE

PLANT WATER INLET



DRAINAGE STRUCTURES			
STRUCTURE #	1	2	3
TOP DIKE ELEV.	890	890	890
BOTTOM WIDTH (b)	270	130	100
SIDE SLOPE (m:1)	4	4	4
FLOW LINE	888	883	889

BROAD CRESTED WEIR

NOTE:
BASINS WITH SAFE WATER ELEVATIONS DESIGNATED AS 'N/A' INDICATE THE VOLUME OF THE BASIN IS NOT USED TO CALCULATE THE SAFE WATER ELEVATION. BASIN IS ASSUMED TO BE FULL AT THE TIME OF THE RAIN FALL EVENT.

LEGEND:
FLOW PATH

N

300 0 300
SCALE IN FEET

URS 8300 College Blvd., Suite 200 Overland Park, Kansas 66210

CLIENT: KANSAS CITY POWER & LIGHT

LOCATION: LACYGNE, KANSAS

TITLE: BASIN DELINEATION AND SAFE WATER LEVELS – UPPER AQC POND LACYGNE POWER GENERATION STATION

DRAWN BY	CHECKED BY	APPROVED BY
REK	LTB	LTB
PROJECT NO.	DATE	FIGURE NO.
16530488	SEPT. 2009	1

600 East 35th Street
Kansas City, Missouri 64131
816-363-3663

Woodward-Clyde Consultants

January 12, 1979
K78-105-1

Mr. Duane G. Jehlik
Division of Water Resources
Kansas State Board of Agriculture
1720 South Topeka Avenue
Topeka, Kansas 66612

SLOPE STABILITY AND HYDROLOGIC DESIGN BASES FOR
NEW FGD SLUDGE RETENTION DAM
LA CYGNE STATION, KANSAS

Dear Mr. Jehlik:

As you requested, we are providing herein a summary of the slope stability and hydrologic design bases which were used in the design of the new FGD sludge retention dam at La Cygne Station.

The dam embankment was designed to have a minimum factor of safety for static slope stability of 1.5 which is consistent with the recommendations contained in the, "Engineering and Design Manual for Coal Refuse Disposal Facilities," published by the U. S. Department of Interior, Mining Enforcement and Safety Administration (MESA). The critical section for the slope stability analysis is a 40 ft high dam embankment section with 2½ horizontal to 1 vertical side slopes and steady state seepage from a reservoir 5 feet below the crest to a 20-foot wide drain located inside the dam on natural ground. Using effective stress shear strength parameters for the embankment material of 20 degrees for the angle of internal friction and 2 psi for the cohesion, we compute a factor of safety in excess of 1.6. Earthquake stability for the dam was investigated by applying a psuedo static horizontal seismic acceleration to the embankment which is consistent with the location of the dam in seismic risk zone 1 (Algermissen, 1969). The computed factor of safety for the previous critical dam section subjected to seismic loading was in excess of 1.4 which is consistent with a recommended minimum factor of safety of 1.2 for seismic loading according to the MESA publication. Since this dam is designed to permanently retain sludge, it was not necessary to consider rapid drawdown conditions for the upstream slope.

The study of the surface water and ground water hydrology related to the development of the proposed sludge retention dam was done under the supervision of Mr. John Halepaska. The diversion ditches were designed

for a 25-year, six hour storm. Details of the surface water and ground water study are presented in the draft report which is attached.

Riprap has not been included in the original design for this dam because the proposed operating procedure for the sludge pond consists of slowly filling the pond with spent sludge. For this reason the water level will rise to its maximum level slowly with resulting fetches less than one mile. It is planned that significant erosion or beaching caused by wave action will be stabilized by future maintenance. If localized riprap is required at the dam crest which is unprotected by the sludge then riprap can be applied where required several years in the future at a substantial savings in cost over the complete installation during initial construction.

Please let us know if you have any further questions regarding the subject or if you have comments on other subjects.

Very truly yours,

J. D. Campbell
Associate

D. M. Duncan, P. E.
Vice President

JDC:DMD:baf

Enclosures

cc: R. Cocayne, KCP&L
E. Chubb, KCP&L

OPERATING PROCEDURE
WATER QUALITY MONITORING PROGRAM
NEW FGD SLUDGE RETENTION DAM - STAGE 1
LA CYGNE STATION

WOODWARD-CLYDE CONSULTANTS
5055 Antioch Road
Overland Park, Kansas
January 10, 1980 K78-105-2

January 10, 1980
K78-105-2

Kansas City Power & Light Company
P. O. Box 679
Kansas City, Missouri 64141

Attention: Mr. F. S. Nelson, Manager
Fossil Plant Construction and Engineering

OPERATING PROCEDURE
WATER QUALITY MONITORING PROGRAM
NEW FGD SLUDGE RETENTION DAM - STAGE 1
LA CYGNE STATION

Gentlemen:

We are pleased to present our report on the groundwater quality monitoring system installed for the new FGD sludge retention dam at La Cygne Station. We have provided an operating procedure for the monitoring system including sampling and testing programs which are in accordance with the requirements of the Kansas Department of Health and Environment.

This report is also intended to satisfy specific requirements of a permit application made to the Kansas Department of Health and Environment for operation of the new sludge disposal facility. Results of the chemical analysis of the water samples are also to be provided to the Kansas Department of Health and Environment as they are obtained by Kansas City Power & Light Company.

If you have any questions regarding this water quality monitoring program, please do not hesitate to contact us.

Very truly yours,

J. D. Campbell
Vice President

Donald M. Duncan, P. E.
Vice President

JDC:DMD:baf

cc: H. Macklin - 1
N. Pinkstaff - 1

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INTRODUCTION

The following procedure is proposed for use in operation of the groundwater quality monitoring system adjacent to the new FGD sludge retention dam built for Kansas City Power and Light Company and Kansas Gas and Electric Company at La Cygne Station. This system was designed to satisfy the requirements of the Kansas Department of Health and Environment for monitoring the performance throughout the design life of the disposal facility. This report was also prepared to provide information requested by the State of Kansas.

The program consists of obtaining water samples on a periodic basis from eleven monitoring holes surrounding the new sludge pond and from domestic wells used by adjacent landowners. Chemical analyses will be performed on these water samples to provide early detection of leachate moving out of the sludge pond. The results of these analyses are to be evaluated on a continuing basis by Kansas City Power & Light Company and a copy of the results are to be provided to the Kansas Department of Health and Environment.

This report includes information concerning the following phases of the program:

1. Installation procedure for the eleven water quality monitoring holes.

2. As-built configuration and boring logs for the eleven water quality monitoring holes.

3. Development of the water quality monitoring holes.

4. Currently recommended sampling frequency and procedures for the water quality monitoring program.

5. Required chemical analyses for all water samples obtained as part of the monitoring program.

A copy of the initial proposed water quality monitoring program proposal is presented in Appendix A along with a letter of recommended modifications to the program from the Kansas State Department of Health and Environment. Eleven water quality monitoring holes were installed in accordance with these documents at the required locations around the periphery of the new FGD sludge retention dam. The as-built location of each installation is presented in Figure 1 and Figure 2.

The following table includes a chronological review of the installation, development, and initial sampling of the monitoring holes.

3/6/79 - 5/31/79	Installation of the monitoring holes
7/9/79 - 7/11/79	Monitoring holes flushed and developed
8/1/79 - 8/3/79	Monitoring holes redeveloped and samples obtained for analysis
10/24/79 -10/26/79	Monitoring holes redeveloped for sampling
12/4/79	Samples obtained for analysis (KCPL technician on site to observe sampling procedure)

INSTALLATION PROCEDURE

The typical configuration of a water quality monitoring hole at La Cygne Station is presented in Figure 3. The design is intended to

facilitate access to the groundwater table with a sampling device such that representative groundwater samples, uncontaminated by surface water, may be obtained for laboratory testing and evaluation. In general, each monitoring hole is a 4-inch-diameter standpipe installed in an 8-inch-diameter predrilled hole. The PVC standpipe consists of a slotted (0.020 inch) bottom section of filter pipe and end cap attached to a non-slotted riser section extending above the ground surface. The depth of the monitoring holes are approximately 40 ft with the slotted section of standpipe set into the shale bedrock for a minimum distance of 15 ft. A relatively clean sand and fine gravel, which was used to backfill the annulus around the slotted section of pipe, extends at least 2 ft above the filter slots. The backfill serves as a filtering medium to control potential for migration of surrounding rock particles into the standpipe. The filter section is sealed below the top of the shale using a 3-foot thick plug of bentonite pellets. The remaining height of the annulus is filled with cement grout. The bentonite and grout prevent seepage of surface water to the groundwater intake zone.

Drilling of the holes was accomplished using a CME-75 rotary drill rig. The procedure consisted of advancing a pilot hole to the design depth using a 4-inch-diameter auger and then redrilling the hole with an 8-inch-diameter wash boring bit. The augering process provided subsurface information concerning the identification and location of the underlying soils and groundwater table. Soil identification was made from cuttings brought to the ground surface while augering, with the location of each material type determined from the length of auger stem in the ground.

An engineer or geologist recorded subsurface information on a boring log for each hole. This information is included in Appendix B. The hole depth and standpipe assembly geometry was determined on the basis of these results. Water used for the 8-inch-diameter wash boring was obtained from Lake La Cygne and transported to a circulating pit excavated adjacent to each hole. After drilling, each hole was flushed with clear water as required to replace the muddy drilling water.

The standpipe sections were assembled at each location while drilling was in progress to allow adequate drying and inspection of the cemented joints. Approximately 2 ft of gravel was placed on the hole bottom prior to lowering the entire standpipe assembly into position. As the gravel backfill was shoveled into the annulus at the ground surface, the standpipe was vibrated by hand to help densify the gravel as it accumulated along the length of the slotted PVC section. Careful measurements were made down the annulus using a plumb bob attached to a steel measuring tape to ensure that the gravel backfill extended at least 2 ft above the slotted PVC pipe. Similar procedures were followed to install the bentonite plug seal. The cement grout used to fill the remainder of the hole annulus was mixed together with a shrinkage retarder in a tank using the drilling pump. The cement grout was introduced into the annulus approximately 2 ft above the bentonite seal using a section of drill rod as a tremie to displace the water to the surface.

Each riser pipe extends approximately 3 ft above the ground surface. All riser pipes are fitted with vented caps and protected by steel

casings with locking lids. For ease in relocation, the positions are marked by 8-foot towers located adjacent to each hole.

DEVELOPMENT PROCEDURE

Development of the water quality monitoring holes involved removal of the water and suspended solids from the standpipe to allow the surrounding clean groundwater to recharge the hole. Each monitoring hole required extensive flushing and development to remove soil and shale cuttings remaining from the drilling process.

A submersible pump and air lift unit were used in the development procedure. Use of the submersible pump to initially flush the holes proved to be unsuccessful. Very slow rates of groundwater inflow together with the amount of suspended solids made the small submersible pump inefficient. An alternate method of air lifting was subsequently utilized successfully for the initial development stage of the monitoring holes. The average time required to remove all water together with suspended solids from each standpipe by this method was approximately two to three minutes. The monitoring holes were developed each day for three consecutive days. Clear water obtained from each hole during the third trial indicated that the initial phase of development of the water quality installations was successful.

RECOMMENDED SAMPLING FREQUENCY AND PROCEDURE

The frequency of sampling for this monitoring program will be quarterly for the first year and semi-annually thereafter unless condi-

tions warrant a change. Representative samples will be obtained from the eleven monitoring holes and from adjacent domestic wells. In addition, one sample of the supernatant fluid from the sludge pond should be obtained during one of the semi-annual sampling programs. This sampling frequency has been approved by the Kansas Department of Health and Environment. Any future modifications to provide for less frequent sampling are to be approved by that department.

Two sets of groundwater samples have been obtained for background testing prior to the start up of FGD sludge disposal into the retention dam. The eleven monitoring holes were sampled between August 1, 1979 and August 3, 1979, approximately three weeks following initial development. A second set of samples from the monitoring holes was obtained in December 1979; and preparations were underway to obtain samples from adjacent domestic wells. The results obtained from these initial samples are to be used as baseline data. They will be compared against results of future samples taken once the pond is in operation.

The initial results showed a high level of visible suspended solids. The acid fixing of samples containing high levels of suspended solids may have contributed to high levels of dissolved solids which were determined by the chemical analysis. Therefore, in agreement with Mr. Chuck Linn of the State of Kansas, Department of Health and Environment, all future water samples will be filtered in the field prior to acid fixing and chemical analysis to ensure that the analysis will reflect the levels of dissolved solids in the groundwater.

The equipment and procedures used for obtaining the water samples from the monitoring holes are outlined below and are recommended for future sampling.

Equipment and materials:

1. Depth measuring device for water level in hole, i.e., measuring tape with weighted plumb bob
2. Hand bailer
3. Flashlight
4. One-gallon plastic bottles with plastic linerless caps and labels
5. One-half gallon plastic bottles with plastic linerless caps and labels
6. Nitric acid
7. pH meter
8. Filtering apparatus

Sampling procedure:

All equipment lowered into standpipe should be clean. Equipment should be protected from contact with the ground when not in use. A source of uncontaminated water is required for rinsing prior to initial entry into the sample hole. The intent of procedures is to obtain representative samples of the natural groundwater at each monitoring hole location; therefore, contamination of the water samples by the sampling equipment must be avoided.

1. Observe and record depth and determine elevation of groundwater in each standpipe.

2. Bail an amount of water from the monitoring hole approximately equal to the volume of water in the hole to ensure that water recharging the monitoring hole will be representative of the groundwater. This bailing may be done in advance of sampling to allow recharge of water to the hole.

3. Rinse bailing unit prior to use at each hole.

4. Rinse the one-gallon plastic container with water obtained using the hand bailer and discard rinse water.

5. Obtain sample using the hand bailer to completely fill the one-gallon plastic bottle to be used for laboratory analysis.

6. Secure the plastic bottle cap and record date, time, and monitoring hole number on the label attached to the one-gallon bottle.

7. Repeat steps 1 through 6 for all monitoring holes.

8. Obtain one-gallon samples of water from domestic wells and by adjacent landowners. Once each year obtain a one-gallon sample of the supernatant fluid from the sludge pond.

9. The field samples are transported to the station laboratory where a pH determination and filtering of the samples can be done under laboratory conditions.

10. Determine and record the pH of each one-gallon field sample.

11. Using a 0.45 micron filter, filter approximately one-half of each of the field samples into ½-gallon bottles; label appropriately. Filtering procedures for samples should be in accordance with the current EPA Methods for Chemical Analysis of Water and Wastes.

12. Into each ½-gallon filtered sample, add nitric acid to achieve a pH of 2 and fix the samples for subsequent chemical analyses.

13. The partially full gallon bottles and the filtered acid fixed ½-gallon bottles (one of each for every monitoring hole, domestic well, and sludge supernatant fluid sample) are then to be promptly shipped to the KCPL Central Results Laboratory for analyses.

Duplicate samples are to be obtained from selected monitoring holes on a periodic basis using the above procedures. One of the duplicate samples would be sent to the KCPL Laboratory and the other duplicate sample would be sent to an independent water quality laboratory to verify results obtained from the KCPL Laboratory.

REQUIREMENTS FOR CHEMICAL ANALYSES AND REPORTING OF RESULTS

Chemical analyses of each of the water samples will be done in accordance with the requirements of the Kansas Department of Health and Environment using the currently approved EPA Methods for Chemical Analysis of Water and Wastes. The analyses will be performed by the KCPL Central Results Laboratory. Periodically duplicate samples will be obtained and analyses will be made by both the KCPL Laboratory and an independent laboratory to provide an independent verification of the results.

A comprehensive analysis of each of the samples will be made during the initial sampling period to determine the quantities for each of the parameters listed in Table 1. The comprehensive analysis will be used to evaluate the uniformity of the groundwater chemistry around the site and to provide additional baseline data for future reference. For the remainder of the quarterly samples obtained during the first year and the semi-annual samples obtained thereafter, chemical analyses should be performed to determine the parameters listed in Table 2. The comprehensive analysis shown in Table 1 may be performed on selected semi-annual samples as required to evaluate variability of the results and to provide

additional baseline data. In addition, each year during one of the semi-annual sampling programs, a sample of the supernatant fluid from the sludge pond should be analyzed to determine the parameters for the comprehensive analysis listed in Table 1.

Evaluation of the potential movement of leachate from the pond is proposed to be based on the sulphate level in the groundwater as determined semi-annually. The results of analyses from each sampling program should be compared with the results of previous analyses and any future regulatory limits to evaluate the performance of the sludge disposal pond.

Results of the chemical analyses for each of the groundwater sampling programs including the annual sampling of the supernatant fluid from the sludge pond should be sent to the Kansas Department of Health and Environment.

TABLE 1

COMPREHENSIVE ANALYSIS
OF WATER QUALITY

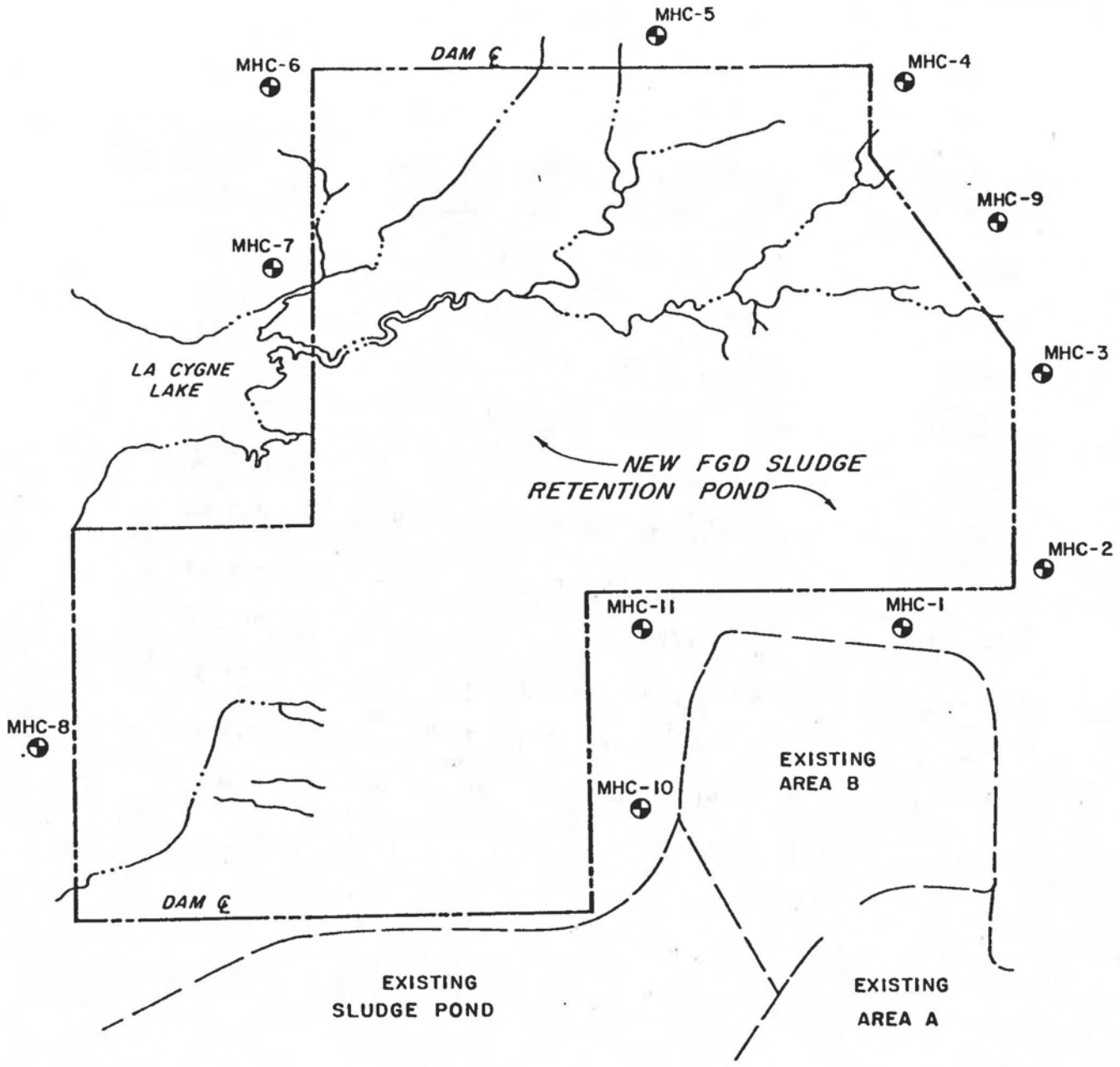
Parameter
Arsenic
Barium
Cadmium
Chromium (VI)
Lead
Mercury
Selenium
Silver
Turbidity
Chloride
Copper
Hydrogen Sulfide
Iron
Manganese
Sulfate
Zinc
pH
Nickel
Specific conductivity
Total dissolved solids
Sulphite

TABLE 2

SEMI-ANNUAL ANALYSIS
OF WATER QUALITY

Parameter

Specific conductivity
Chloride
Total dissolved solids
Concentrations of the principal constituents, or indicators thereof, found in the largest quantity in the waste disposed of in the facility: sulphate
sulphite



Legend;

MHC-1 Monitoring Hole number one
Ground Water Monitoring Hole

N

0 500 1000
SCALE, ft

SLUDGE RETENTION DAM — LA CYGNE STATION
KANSAS CITY POWER & LIGHT
KANSAS GAS & ELECTRIC

PROJECT NO. K 78-105-2

WOODWARD-CLYDE CONSULTANTS
CONSULTING ENGINEERS, GEOLOGISTS, AND ENVIRONMENTAL SCIENTISTS
CENTRAL REGION

DRN. BY: Kath 12-6-79
CHKD. BY: JDC

MONITORING HOLE
APPROXIMATE LOCATION MAP

FIG. NO. 1

Monitoring Hole Number	State Plane Coordinate System Y-Coordinate	X-Coordinate	Elevation of Top of Steel Casing Feet, MSL
MHC-1	N 641,739.30	E 3,110,778.06	878.67
MHC-2	N 642,212.51	E 3,111,371.68	881.84
MHC-3	N 643,147.94	E 3,111,309.55	880.19
MHC-4	N 644,796.58	E 3,110,503.45	883.83
MHC-5	N 644,797.21	E 3,109,390.82	870.46
MHC-6	N 644,594.93	E 3,107,325.95	860.66
MHC-7	N 643,703.19	E 3,107,336.26	856.79
MHC-8	N 640,710.74	E 3,106,187.53	854.08
MHC-9	N 643,978.07	E 3,110,945.65	881.01
MHC-10	N 640,875.97	E 3,109,343.58	874.73
MHC-11	N 641,713.60	E 3,109,304.39	876.81

SLUDGE RETENTION DAM — LACYGNE STATION
KANSAS CITY POWER & LIGHT
KANSAS GAS & ELECTRIC

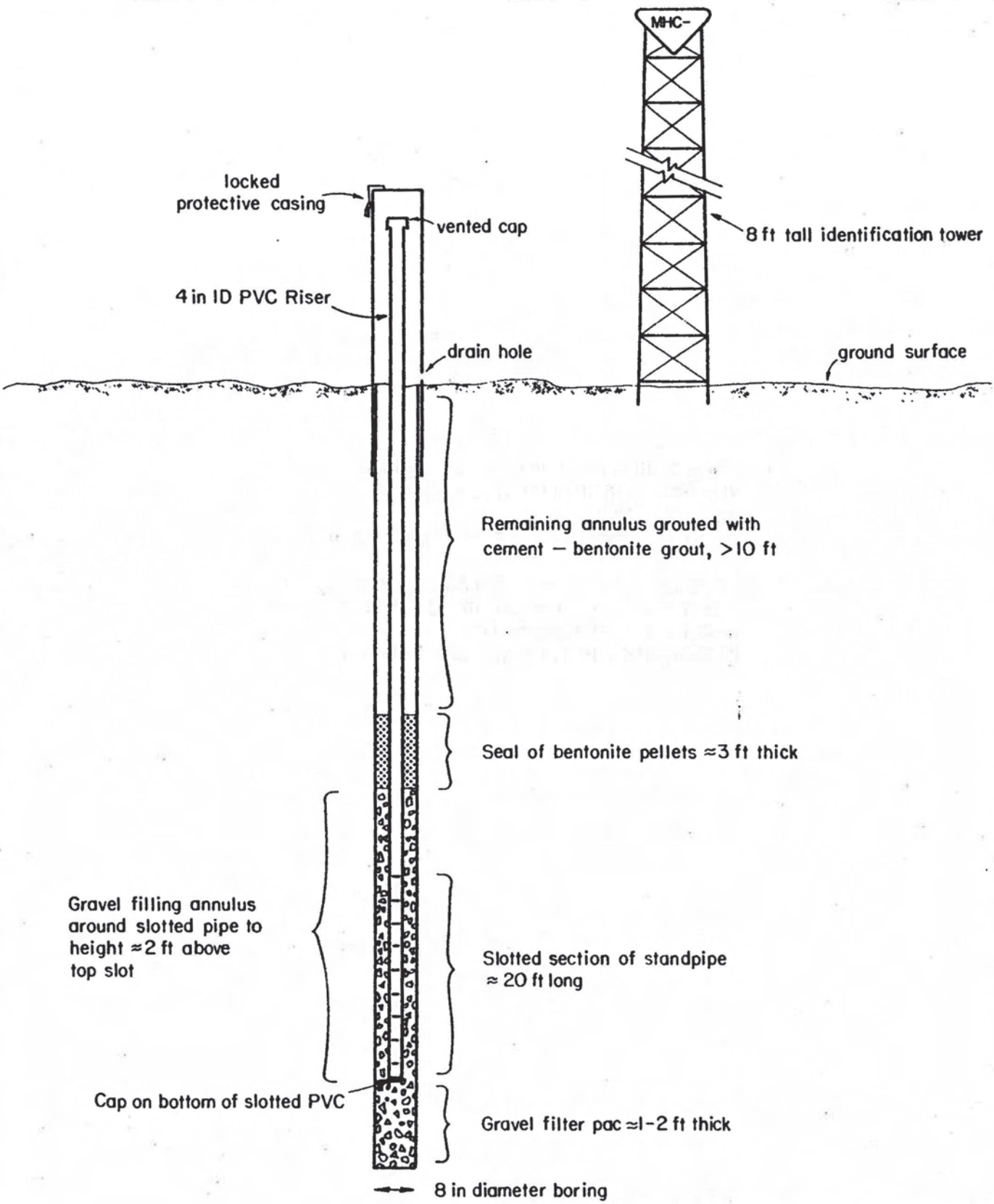
PROJECT NO. K78-105-2

WOODWARD-CLYDE CONSULTANTS
CONSULTING ENGINEERS, GEOLOGISTS, AND ENVIRONMENTAL SCIENTISTS
CENTRAL REGION

DRN. BY: BAF 1-9-80
CHKD. BY: JDC

MONITORING HOLE COORDINATES AND ELEVATIONS

FIG. NO. 2



SLUDGE RETENTION DAM – LACYGNE STATION KANSAS CITY POWER & LIGHT KANSAS GAS & ELECTRIC	PROJECT NO. K 78-105-2

WOODWARD-CLYDE CONSULTANTS

CONSULTING ENGINEERS, GEOLOGISTS, AND ENVIRONMENTAL SCIENTISTS
CENTRAL REGION

DRN. BY: [illegible] 12-12-79 CHKD. BY: JDC	TYPICAL WATER QUALITY MONITORING HOLE	FIG. NO. 3

APPENDIX A

(1) "WATER QUALITY MONITORING PROGRAM FOR NEW FGD SLUDGE RETENTION POND AT LA CYGNE STATION"
ORIGINAL PROPOSAL, FEBRUARY 9, 1979

(2) "COMMENTS ON PROPOSED GROUNDWATER QUALITY MONITORING PROGRAM BY DEPARTMENT OF HEALTH AND ENVIRONMENT"
RECOMMENDED MODIFICATIONS, MARCH 1, 1979

600 East 95th Street
Kansas City, Missouri 64131
816-363-3663

Woodward-Clyde Consultants

March 6, 1979
K78-105-2

Mr. Eugene Chubb
Kansas City Power & Light
P. O. Box 679
Kansas City, Missouri 64141

COMMENTS ON PROPOSED
GROUNDWATER QUALITY MONITORING PROGRAM BY
DEPARTMENT OF HEALTH AND ENVIRONMENT

Dear Gene:

I have enclosed a letter from Chuck Linn of the Kansas Department of Health and Environment giving his comments on our water quality monitoring program for the FGD sludge retention pond at La Cygne Station. In summary, Linn felt that the monitoring program was satisfactory except that he would like to have three additional monitoring holes installed. Two of the holes would be installed west of the existing Area B and one additional hole would be installed in the northeast quadrant of the new sludge pond to fill in the distance between two of the proposed monitoring holes. You may note the location of these three additional holes on his attached marked up copy of Figure 1.

As I discussed with you, I have been back with Chuck Linn and confirmed to him that we will comply with his recommendations for modification of the water quality monitoring program at La Cygne Station.

Mr. Linn has all of the required permit applications and information to issue a letter authorizing construction of the sludge retention dam. Chuck said that he would have that letter in the mail to us this week. I informed him of our schedule and the fact that the contractor would likely begin earthwork operations at the end of this week.

Please let me know if you have any questions regarding comments made by Chuck Linn.

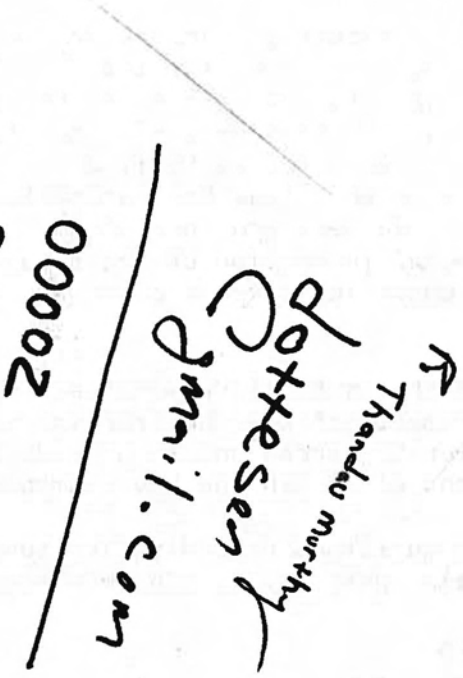
Very truly yours,

J. D. Campbell
Vice President

JDC:baf

cc: R. Cocayne
H. Macklin
N. F. Pinkstaff

DAM CONSTRUCTION AND OPERATION
NEW FGD SLUDGE RETENTION DAM - STAGE 1
LA CYGNE STATION



WOODWARD-CLYDE CONSULTANTS
5055 Antioch Road
Overland Park, Kansas
January 22, 1980 K78-105-2

January 22, 1980
K78-105-2

Kansas City Power & Light Company
P. O. Box 679
Kansas City, Missouri 64141

Attention: Mr. F. S. Nelson, Manager
Fossil Plant Construction & Engineering

DAM CONSTRUCTION AND OPERATION
NEW FGD SLUDGE RETENTION DAM - STAGE 1
LA CYGNE STATION

Gentlemen:

We are pleased to present our report on the dam construction and proposed operating procedures for the new FGD sludge retention dam - Stage 1 at La Cygne Station. This report and the as-built construction drawings, bound separately, provide a summary of the dam construction work and final as-built quantities. Additional details of the construction work have been presented previously in our monthly reports. We have provided proposed procedures for operation of the sludge pond, inspection of the sludge retention dam, and a summary of the operating procedure for the water quality monitoring program.

This report and the as-built drawings are also intended to satisfy specific requirements of the construction permit issued by the Kansas Division of Water Resources and to provide further information to the Kansas Department of Health and Environment.

If you have any questions regarding the summary of the construction or proposed operating procedures, please do not hesitate to contact us.

Very truly yours,

J. D. Campbell
Vice President

Donald M. Duncan, P. E.
Vice President

JDC:DMD:baf
cc: H. Macklin
N. Pinkstaff

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EXHIBITS

DAM CONSTRUCTION AND OPERATION
NEW FGD SLUDGE RETENTION DAM - STAGE 1
LA CYGNE STATION

INTRODUCTION

A new FGD sludge retention dam was constructed at Kansas City Power and Light Company and Kansas Gas and Electric's La Cygne Generating Station in Kansas approximately 55 miles south of Kansas City. Design and construction management for the dam were provided by Woodward-Clyde Consultants. Sherwood Construction Company, Inc. was the general contractor for the dam.

The new dam and sludge pond shown in Figure 1 will comprise a surface area of approximately 330 acres when the water surface elevation reaches its maximum operating level for Stage 1. The maximum dam height from the downstream toe to the crest is approximately 45 feet on the west alignment with the minimum dam height of approximately 6 feet along the eastern portion of the dam. The storage capacity of this Stage 1 reservoir is approximately 7,000 acre-feet at the normal maximum operating level at elevation 885.8 ft.

Provisions have been made in the design and construction of this Stage 1 dam to make it possible to raise the dam in the future and increase the capacity of the disposal facility. Kansas City Power and Light Company has estimated that this Stage 1 facility will have a life of approximately ten years. A conceptual plan was developed to use upstream dam construction to raise the Stage 1 dam approximately an additional 20 ft. The Stage 2 starter dam which partially divides the new sludge pond will permit raising

the Stage 1 dam in two phases if desired. The service spillway structure is designed to accommodate an additional 20-foot extension.

All phases of the Stage 1 dam construction are essentially complete and have been accomplished in accordance with the project specifications and drawings. In general, landscaping for the project has been completed; however, it had not been accepted at the time this report was prepared. Landscaping has not been completed under the north 345 KV power line crossing at station 9+00. Project drawings have been revised to reflect the as-built configuration of the dam and are transmitted separately with this report.

The contents of this report include a general discussion of the dam construction and operating procedures which are proposed to assist Kansas City Power and Light Company in the safe and efficient operation of the new dam and sludge pond. Proposed procedures have been included for general operation of the sludge pond and installation of stop logs, procedure for dam safety inspections and summary of procedure for the water quality monitoring program.

DAM CONSTRUCTION AND QUALITY CONTROL

Sherwood Construction Company was awarded the construction contract for the dam following the issuance of construction permits by the Kansas Division of Water Resources and the Kansas Department of Health and Environment. All phases of the dam construction were completed between March 6, 1979 and December 14, 1979, with the placement of earthfill

being completed by November 1, 1979. Embankment construction was initiated in the northeast quadrant of the dam and progressed to the southwest alignment during the optimum summer construction period. The construction progress for the earthfill is graphically presented in Figure 2. The increased rate of embankment construction between June and October resulted from the addition of a night construction shift along with the utilization of additional earth-moving equipment. All field construction activities were documented in daily and monthly reports presented to Kansas City Power & Light Company.

Engineering and Quality Control

Engineering and construction management for the dam were provided by Mr. K. J. Nyman of Woodward-Clyde Consultants as resident project engineer during construction of the dam and appurtenant structures.

Quality control of the embankment construction throughout the project was assured by visual observation of the fill placement process and by in situ soil testing which included the determination of fill densities and water contents. Soil densities were determined in the field by using nuclear testing and a sand cone device. The testing frequency was approximately one test per 1,200 cubic yards of compacted fill. Water contents for the same samples of fill were measured by the nuclear device, and were determined from oven and/or stove drying methods available at the site laboratory. The results of each test were then compared with laboratory compaction curves obtained for the individual soil types to determine acceptance of construction. According to the

contract specifications, acceptable limits of density and moisture content for the placed fill were as follows:

1. The dry density of the placed fill must be equal to or greater than 95 percent of the dry density achieved from the standard compaction test designated ASTM D698-70 (i.e., 95 percent relative compaction). Laboratory compaction tests were performed on each type of soil to be used for fill.

2. The water content of the placed fill must be within ±2 percent of the optimum water content for each soil type as determined from the standard compaction tests.

All earthfill was placed or reworked in accordance with the specifications outlined above.

In addition to the daily inspection performed by the WCC staff, representatives from the Kansas Department of Water Resources made periodic on-site inspections and approved all foundation stripping required for the project. A final inspection of the project was made by representatives of the Kansas Department of Health and Environment when the dam was essentially complete.

As-Built Drawings

As-built construction drawings are bound under separate cover and transmitted with this report. Revision No. 2 to the drawings (as-built construction) is essentially the same as Revision No. 1 issued for construction with minor changes and additions. Revision No. 1 of the drawings

issued for construction were approved by the Kansas Department of Water Resources and the Kansas Department of Health and Environment. All additions and changes to Revision No. 1 are identified with a "/2\" adjacent to the addition or change. All additions and changes made during construction to Revision No. 1 are in general accordance with the approved plans and specifications, and are outlined in Table 1. There were no changes to the Technical Specifications other than an extension to the contract to allow acceptance of late fall seeding.

Payment Quantities for Construction Work

Measurement for all as-built earthwork quantities was in accordance with the project specifications and were determined from engineering surveys. Original estimates along with as-built quantities for each pay item included in the contract are presented in Table 2. The reasons for the changes between the original estimates and the as-built quantities are documented in the Monthly Reports.

OPERATING PROCEDURES

The following include some recommended procedures to assist Kansas City Power and Light Company in the safe and efficient operation of the new FGD sludge retention dam. These procedures include:

1. General Operating Procedure
2. Operating Procedure for Safety Inspection and Instrumentation
3. Operating Procedure for the water quality monitoring program

General Operating Procedure

The new sludge retention dam reservoir configuration comprises two rectangular quadrants located north of the adjacent sludge pond presently being utilized for sludge disposal. Locations of the influent pipe, service spillway and emergency spillway for the new dam and sludge pond are shown in Figure 3. The service spillway system at station 96+50 on the dam alignment includes a structure consisting of a vertical drop inlet leading to a closed conduit which passes through the embankment to the existing sludge pond, see Figure 4. The bottom of the inlet to the service spillway structure is located at elevation 865.0. Therefore water from the sludge will return from the new pond into the old pond when the level reaches elevation 865. The service spillway structure has been fabricated to accommodate stop logs which may be inserted to raise the bottom inlet elevation as sludge and water accumulate in the new pond. The intention of this design is to add stop logs periodically only when necessary to prevent excess discharge from the new pond as a result of precipitation or displacement by disposed solids.

The emergency spillway is a 50-foot long broad crested weir located at station 84+50 on the new dam alignment. The spillway elevation at 887.0 is 3 feet lower than the dam crest elevation. The normal maximum operating level for the new pond is elevation 885.8 which may be attained after several years of operating the new disposal facility.

The new dam and disposal pond is designed to act as a sedimentation basin which will accept and hold FGD sludge while maintaining a minimum

amount of free surface water. FGD sludge consisting of water and suspended solids will be introduced into the pond at the influent pipe location with a flow rate of approximately 5000 gpm. The natural slope of the reservoir bottom will initially cause the sludge to circulate from the northeast quadrant to the southwest quadrant of the reservoir. Along this route, the suspended solid particles will be sedimented out of the sludge leaving free water at the service spillway structure. This water will be decanted from the reservoir through the service spillway into the old sludge pond which will serve as a surge pond for the new reservoir. The objective of the service spillway structure is to remove and control the outflow of free water from the new reservoir such that, under normal operating conditions, the required recirculation water to maintain a flow of sludge at 5,000 gpm would be discharged. During times of storms, the water surface in the new reservoir would rise and more water would discharge through the service spillway.

The new dam reservoir has a surface area which is approximately three to four times larger than the adjacent surge pond which has recently been dredged. Precipitation from the design storm would raise the water level approximately 2 ft in the new reservoir. If the reservoir were at its normal maximum level and all this storm water were to flow into the surge pond, it would raise the water level in the surge pond about 6 to 8 feet. We recommend that the surge pond be operated at a water level which is approximately 8 to 10 feet below the normal maximum level

in order to prevent any possible overtopping into Lake La Cygne and to provide for normal operating fluctuations. This is possible because the recirculating pumps from the surge pond have a flexible pick-up hose which floats on the water surface.

During the early stages of operation of the new pond, the water level would be low. As the sludge pond is filled with sludge sediments and excess rain accumulation, the operating water level must be raised by periodically adding stop logs to maintain the controlled circulation rate of approximately 5,000 gpm until the maximum operating level at elevation 885.6 is achieved. During the early life of the pond, the primary cause for the rise in operating water level of the pond is the accumulation of sludge sediment volume and rainfall within the relatively small area or wetted perimeter in the lower portions of the pond. As the pond level approaches the maximum operating level, the water surface area in both the sludge pond and surge pond will maximize allowing the rainfall and sludge accumulation to be more nearly balanced by evaporation. Thus, in the later stages of the pond operation, rainfall accumulation would have relatively less of an effect on increasing the reservoir level.

In order to maximize the design life of the sludge pond, a minimum number of stop logs should be added to the spillway structure at any one time to control the discharge flow. Thus a minimum amount of free water would be retained in the pond. We recommend that only one level of stop logs

be permanently installed into the spillway structure at any one time. The number and frequency of stop log installations will be controlled by the actual usage and excess rainfall accumulation in the pond. Deviations from normal use due to plant shutdowns and changes in influent sludge flow quantities will directly affect the stop log requirement at the spillway structure.

During normal operation, a circulation rate of approximately 5,000 gpm would produce a head of water flowing over the stop logs of approximately 7 inches. Substantial rainfall or an increase or decrease in pumping rate will proportionately change the depth of water flowing over the stop logs. In general a single level of stop logs should be added to the spillway structure if, under continuous normal operating procedures, the surge pond level increases to within 4 to 5 ft of its maximum operating level.

Installation Procedure for Stop Logs

The service spillway structure is located approximately 100 feet from the inside toe of the dam. A special ramp flotation structure has been fabricated to gain access to the service spillway structure during its lifetime of operation. The flotation ramp and platform shown in Figure 5 should be installed after the operating water level reaches elevation 865.0. Two deadman weights used to anchor the structure for stability were fabricated and are stored with the stop logs and steel face plates at the south access road intersection with the dam. Additional ramp sections which are provided will be added to lengthen the flotation structure rampway as the pond becomes filled.

Since each stop log weighs approximately 225 pounds, a special lifting apparatus will be needed to facilitate the stop log installation process. A lifting apparatus has not been provided; however, a schematic for a proposed lifting device is shown in Figure 6a. The assembly basically consists of a reaction beam and wench system with lifting clamps. Each stop log has been built to include 1-inch square lifting holes as shown in Figure 7a. The general set up for lifting the stop logs into place is presented in Figure 6b. Once the stop log is hanging in the slot above the water surface a steel plate is loosely fastened to the stop log. The new stop log and steel plate are then lowered and tamped into place on top of the existing stop log. The stop log and steel plate are then secured to the spillway structure using the two threaded bolts extending from the stop log shown in Figures 7a and 7b. The space between the stop log and the steel plate is then filled with dry concrete mix which will hydrate under water and serve as a seal for the stop logs. The surface of the dry concrete may erode slightly before it sets up but this void will be filled when the next stop log is added on top and additional concrete mix is added.

Operating Procedure for Safety Inspection and Instrumentation

Safety Inspection

This dam is designed and constructed to function safely as a water retaining structure for an indefinitely long period. A program of inspection and periodic maintenance will be required to maintain the structural integrity of the earth embankment. It is imperative that

a program of specific observations at regular intervals of time be established to identify problem areas which may develop. It is proposed that the inspection program described herein be conducted by a Kansas City Power and Light engineer at least once each year. In addition, special inspections should be made before, during, and after any planned or unplanned event that is outside the normal routine. Such events include earthquake shocks of all intensities, unusual filling or rates of withdrawal of water, heavy rainstorms, including long duration or consistently frequent rains over an extended period of time, unseasonal storms or droughts, and whenever routine observations indicate a change in the trend of data or behavior pattern of the facility. Special observations and investigations should be made whenever unusual wet or green spots occur on the surface of the dam, cracks develop, unusual or differential settlement occurs, any signs of instability in the dam slopes or around the spillway, intake structure or outlet works, or any other change is noted.

On his initial inspection of the dam, the engineer should logically begin with an examination of the design and construction documents. The engineer should familiarize himself with items such as the design assumptions, the design drawings and as-built cross sections, locations of conduits within the dam, settlement monument instrumentation or other instrumentation, site and subsurface conditions before the dam was built, and construction procedures.

The inspector should review the records of operation, inspection maintenance, and instrumentation. This review may alert him to recurring problem areas, indicate whether the dam is being operated in accordance with the design assumptions, and give a general idea of the degree of care given to dam inspection and maintenance. This review of the dam's history is especially important since changes in the dam performance over time rather than the performance at one particular point in time may provide a better understanding of potential problems.

Observations made by the engineer during the inspection should be systematically recorded including the date, time, location of the observation, description of what was observed, elevation of the reservoir water surface at the time of the observations, and a description of the weather. The following inspection outline may be expanded to include these observations. The recorded observations including photographs of typical areas of the dam together with photographs of potential problem areas should be permanently filed. These records will provide the basis upon which the future performance of the dam will be evaluated. These inspection reports should be reviewed periodically by the Design Engineer or another engineer with experience in earth dams. A detailed inspection or investigation should be made whenever an event or observation indicates the development of potentially hazardous conditions.

A report of each safety inspection should be prepared by the engineer making the inspection which would summarize the condition of the dam and items which need remedial work or further investigation. The report should be transmitted to the Plant Superintendent for his review and approval of the work to be done.

Instrumentation

The Stage 1 dam has been instrumented with a series of eight settlement monuments, designated SMC-1 through SMC-8, along the dam crest on the western side of the sludge pond as shown in Figure 8. These monuments consist of a steel rod anchored in concrete at a depth of from about 4 to 5 ft below the downstream crest of the dam. The portion of the rod above the concrete anchor is isolated from the soil and protected by free-floating PVC tubing.

The purpose of the monuments is to provide an initial simple form of control for the dam at its highest section. The top of this steel rod has been surveyed to determine its initial elevation and x and y coordinates; these data are presented in Table 3. While no dangerous movements are expected to occur in the dam, these monuments may provide a basis for verifying the operating performance as the reservoir is filled and will provide a basis for monitoring performance if the dam is raised to expand the capacity of the disposal facility.

INSPECTION OUTLINE

1. Vegetation

Vegetation on the embankment and within 50 feet of the downstream toe of the dam should be examined with regard to excessive height or overgrowth, wet terrain vegetation, and completeness of coverage. The growth of vegetation should be controlled to allow accessibility and visibility of the site if inspections are to be meaningful.

Variations in the growth pattern and type of vegetation often indicate areas of seepage concentration. In locations where wet terrain vegetation prevails, it is especially important to be alert for boils or evidence of previous boils. It should be noted if the wet terrain vegetation changes with the seasons or with fluctuations in the reservoir water level. Where the vegetative cover is incomplete due to poor growth or erosion, it should be noted in the inspection and repaired.

Boils are one of the most significant and visible potential problems with regard to dam safety. It is most important that a dam inspector be aware of how a boil forms and what it looks like. A boil is simply a concentration of seepage on the downstream face of the dam or on the terrain downstream of the dam's toe. Normal seepage may also exist in these areas but its velocity is barely perceptible and is not sufficient to displace any soil particles. Also, normal seepage is more or less uniformly distributed over the area. At a boil, the seepage concentration is usually from less than an inch to several inches in diameter. The velocity of water exiting at the boil is readily apparent and is sufficient to lift the soil particles at the ground surface. This lifting or agitation of the soil particles at the ground surface is the basis for the name "boil." As the soil particles are displaced, they will form either a small cone around the boil, similar to a miniature volcano, or a fan-shaped alluvial deposit or delta adjacent to the boil. If the seepage velocities are relatively high, soil particles may continue to erode, forming a hole or "pipe" as it erodes the soil upstream beneath

the dam. As the pipe extends upstream, the velocity of water increases, increasing the rate of erosion and may eventually cause the dam to fail as a result of a washout.

Vegetation on dam and within 5 feet beyond toe of dam.

A. Overgrowth

1. Requires cutting for embankment surveillance
2. Requires weed control for embankment surveillance
3. Indicates seepage or excessive capillarity

B. Wet Terrain Vegetation

1. Watch for boils
2. Watch for sand cones, deltas, etc.
3. Changes with the seasons or fluctuations in reservoir water level.

C. Incomplete Vegetation: Requiring Repair

1. Poor growth
2. Destroyed by erosion

II. Diversion Drainage Ditches

The condition of east and north diversion drainage ditches are an important safety inspection item. The diversion drainage ditches were incorporated in the dam design to divert surface runoff around the dam and into the Lake La Cygne area. The inspector should note whether or not the drainage ditches and conduits are unobstructed, free of vegetation, and performing their intended function.

A. Drainage Ditches

1. Clogged with vegetation or other obstructions

2. Quantity of flow

3. Silt accumulations in ditch and around culverts

III. Embankment

The condition of the embankment's crest, with regard to any evidences of settlement or cracking should be noted. On the upstream face of the embankment, particular attention should be given to cracks in the embankment, surface erosion and gullying, and wave erosion. No riprap was installed during the initial construction of the dam because the water level would change with time and free water would be very shallow over portions of the pond. Therefore, each inspection should carefully evaluate the need for local application of riprap to prevent wave erosion.

The downstream face should be examined for cracking, subsidence, bulging, erosion (noting especially the gully depth and whether seepage is apparent on dry days), damp areas and boils or seeps. The terrain with 50 feet of the downstream toe should be inspected for the presence of erosion gullies, damp areas or boils and seeps.

Photographs should be taken to document embankment conditions. Comparison should be made between present conditions and those noted in previous reports.

A. Embankment

1. Freeboard - pond level

2. Crest

    a. Cracking

    b. Subsidence, movement - consider need to resurvey instrumentation

    c. Instrumentation - condition and protection of settlement monuments

3. Upstream Face

    a. Cracking

    b. Surface erosion, gullying

    c. Wave erosion and need for local riprap

    d. Voids, rodent holes

4. Downstream Face

    a. Cracking

    b. Subsidence

    c. Bulging

    d. Erosion gullies

        1. Depth

        2. Moisture on dry days

    e. Damp areas

    f. Boils, seepage

    g. Riprap condition if installed, settlement, displacement

    h. Voids, rodent holes

IV. Service Spillway Structure

Inspection of the service spillway should include condition of the concrete, stop logs, spillway culvert and flotation structure. This would include an examination as to whether the intake structure is sufficiently free of debris or other material that could block the spillway and prevent it from maintaining the water level at the proper height over the stop logs. Inspection of the 30-inch diameter spillway culvert should include an examination of the conduit condition, an examination for any seepage or damp areas around the conduit, as well as erosion and any boils within the vicinity of the conduit. Areas of previous repair should be examined to determine the effectiveness of the repair and whether the initial trouble has expanded into new areas. Photographs should be taken to document the present condition of the facilities. Comparison should be made between present conditions and previous reported conditions and previous photographs.

A. Service Spillway Structure

1. Concrete

a. Spalling, erosion, cracking, rebars exposed

b. Seepage through cracks

c. Condition of repaired areas

d. Document condition with photograph

e. Condition and number of stop logs installed to date

2. Depth of water discharging over stop logs

3. Service spillway culvert

   a. Discharge culvert condition

   b. Seepage or damp areas around culvert

   c. Erosion below culvert

   d. Boils in vicinity of culvert

3. Flotation structure

   a. Require additional ramp length

   b. Anchored correctly

   c. Condition of floats

V. Internal Filter Zones

Internal filter zones were installed in the main dam embankment to collect the water which will slowly seep through the dam. Proper functioning of the filter zones is important to the embankment slope stability. A small amount of water flowing out of the drains at the toe of the dam is normal. Evidence of wet areas or concentrated and/or substantial water seepage through the filter zones where they intersect the outside dam slope should be noted. Evidence of silt or clay material being washed through the drainage zones should be studied by an engineer experienced in dam design.

A. Internal Filter Zone

1. Evidence of water seepage through the filter zones; note location and amount of seepage

2. Evidence of embankment material being washed through the filter zones

VI. Surge Pond

The surge pond located adjacent to the dam must be operated at a sufficient level such that discharge from the new reservoir during heavy rains will not cause overtopping into Lake La Cygne. The operating level of the surge pond should average approximately 8 to 10 feet below the spillway crest to provide capacity for storm water discharge from the sludge pond.

A. Surge Pond

1. Depth of surge pond level below spillway crest

VII. Emergency Spillway

The emergency spillway may become operable under heavy storm conditions when the new reservoir level approaches the maximum operating level at elevation 885.6. Its purpose is to discharge excess rainfall accumulation within the new sludge pond safely to Lake La Cygne without overtopping the dam. The emergency spillway weir area should be free of all debris which may prevent efficient operation. The riprap on the upstream and downstream face of the emergency spillway should be checked for excessive displacement, erosion and plant growth.

A. Emergency Spillway

1. Free of debris

2. Riprap displacement and erosion and plant growth

VIII. Evaluation Report of Inspection

The results of the inspection should be carefully evaluated by the engineer making the inspection to identify potentially hazardous conditions, items of needed remedial work, areas which require additional inspection or investigation, and recommended changes to the current operating procedures. A report summarizing the condition of the dam and required action items should be submitted to the Plant Superintendent for his review and approval of needed repairs or further investigation.

OPERATING PROCEDURE FOR THE WATER QUALITY MONITORING PROGRAM

The following water quality monitoring program is currently in operation for monitoring the groundwater quality adjacent to the new FGD sludge retention dam at the La Cygne Station. This program was designed and installed to satisfy the requirements of the Kansas Department of Health and Environment throughout the lifetime of this disposal facility.

The primary purpose of the program is to investigate any change in surrounding groundwater quality due to the operation and use of the new sludge retention dam. The investigation will be accomplished by evaluating groundwater samples obtained from newly installed monitoring holes and existing domestic wells used by adjacent landowners. A more detailed discussion containing information for the installation of the monitoring holes is included in a separate report, "Operating Procedure, Water Quality Monitoring Program, New FGD Sludge Retention Dam - Stage 1, La Cygne Station" by Woodward-Clyde Consultants dated January 10, 1980.

Eleven water quality monitoring holes, designated MHC-1 through MHC-11, were installed in accordance with these documents at the required locations around the periphery of the new FGD sludge retention dam. The approximate location of each installation is presented in Figure 8. The elevations and coordinates of each of the monitoring holes are presented in Table 4.

The typical configuration of a water quality monitoring hole at La Cygne is presented in Figure 9. The design is intended to facilitate access to the groundwater with a sampling device such that representative groundwater samples, uncontaminated by surface water, may be obtained for laboratory testing and evaluation.

The riser pipes extending above the ground surface are fitted with vented caps and are protected by steel casings with locking lids. All installations are identified with 8-foot marking towers located adjacent to each hole.

Sampling and Testing Program

Detailed recommendations for sampling and testing procedures are contained in Woodward-Clyde Consultant's report, "Operating Procedure, Water Quality Monitoring Program, New FGD Sludge Retention Dam - Stage 1, La Cygne Station" dated January 1980.

The frequency of sampling for the monitoring program will be quarterly for the first year and semi-annually thereafter unless conditions warrant a change. Representative samples will be obtained from the eleven monitoring holes and from adjacent domestic wells. A chemical analysis

for all samples obtained during the program will be performed by the Kansas City Power and Light central laboratory. Results of each chemical analysis are to be made available to the Kansas Department of Health and Environment as a condition of their operating permit for the disposal facility.

TABLE 1 - AS-BUILT ADDITIONS AND CHANGES TO REVISION 1 OF THE APPROVED CONSTRUCTION DRAWINGS No. KC205.80 DATED JANUARY 1979

Drawing Identification	Addition	Change	Description of Addition and/or Change
Sheet 1 - Site Location Plan	---	---	No additions or changes
Sheet 2 - Site Plan and General Arrangement	X		Locations for settlement monuments SMC-1 through SMC-8.
	X		Location of the intersection of south access road with the dam alignment.
	X		Location of the east ditch haul road crossing.
		X	As-built location of the spoil material dike for diversion of sludge station 131+00.
	X		Locations of the water quality monitoring holes MHC-1 through MHC-11.
Sheet 3 - Limits of Clearing, Grubbing, Stripping, and Spoil Areas		X	As-built location of the spoil material dike for diversion of sludge centerline station 131+00
Sheet 4 - Borrow Area and Boring Location Plan		X	As-built location of the spoil material dike for diversion of sludge centerline station 131+00.
Sheet 5 - Dam Foundation Grade and Excavation Plan	---	---	No changes or additions
Sheet 6 - Dam and Spillways Plan	X		Stationing for location of service spillway at station 96+50.
		X	As-built shift in centerline location of spoil material dike for diversion of sludge station centerline 131+00.
	X		Location of the east ditch haul road crossing station 40+25.

Drawing Identification	Addition	Change	Description of Addition and/or Change
Sheet 7 - Dam Embankment Sections and Details	X		Depth of stripping for the typical dam cross sections at stations 11+00, 28+00, 40+00, 84+50, 98+00, 108+00 and 156+00.
		X	Location of natural ground surface as surveyed for the typical dam cross sections and locations of the filter drains at stations 11+00, 28+00, 40+00, 84+50, 98+00, 108+00 and 156+00.
	X		Slope information, 1 vertical to 1 horizontal, for the riprap berms at the emergency spillway.
Sheet 8 - Service Spillway Plan, Sections, and Details		X	As-built configuration of the service spillway basin in front of the decant structure.
		X	A 5-foot shift in location of the anti-seepage collars.
	X		As-built dimensions and elevations for the service spillway configuration.
	X		Schematic for the as-built deadman weights used to anchor the flotation system.
		X	Location of the access ramp connection to the platform at the end of the flotation structure.
	X		Special overhead frame on the back of the flotation platform which would allow the entire assembly to initially rest on the base of the decant structure.
		X	Square lifting holes fabricated into the stop logs instead of round holes shown in the partial plan and rod detail for the stop logs.
Sheet 9 - Service Spillway Reinforcing	X		Correction for addition of four vertical reinforcing bars for Section C-C.
		X	Correction for the height of the lap opening inside the decant structure Section A-A.

Drawing Identification	Addition	Change	Description of Addition and/or Change
Sheet 9 - continued		X	Configuration of the reinforcing steel ties shown in the typical stop log section.
Sheet 10 - Diversion Ditches Plan and Profile		X	As-built location of the county road culvert leading into the east ditch at station 24+00.
		X	Existing grade for the east ditch as surveyed in the field.
	X		Elevations and locations of existing drainage culverts leading into the east ditch along with as-built elevations for the bottom of the east ditch grade.
	X		Location of haul road crossing for the east ditch at station 40+25.
Sheet 11 - Diversion Ditches Sections and Details		X	As-built configuration showing the existing grade and excavated grade for all cross sections for the east ditch.
		X	As-built configuration showing the existing grade and excavated grade for cross sections of the north ditch at station 18+80.
Sheet 12 - Horizontal and Vertical Control Data	---	---	No additions or changes
Sheet 13 - East Ditch Haul Road Crossing Culvert	---	---	New drawing showing details of the as-built east ditch haul road crossing which was required by KCPL.

TABLE 2
CONSTRUCTION REQUIREMENTS
AND AS-BUILT QUANTITIES

		QUANTITIES		
		Original Bid Estimate	As-Built	Difference (As-Built Original)
TS-1	Mobilization	Lump sum	Lump sum	-0-
TS-3A	Clearing and Grubbing	Lump sum	Lump sum	-0-
TS-3B	Stripping Foundation (cubic yards)	95,000	221,284	126,284
TS-5A	Ditch Excavation (cubic yards)	65,000	93,954	28,954
TS-5B	Sludge Excavation (cubic yards)	1,000	998	-2
TS-6A	Impervious Fill (cubic yards)	1,000,000	1,305,502	305,502
TS-6B	Random Fill (cubic yards)	600,000	441,317	-158,683
TS-13	Random Fill - Alternate (cubic yards)	110,000	116,633	6,633
TS-7	Filter Zones (cubic yards)	40,000	34,800	-5,200
TS-8A	Riprap (square yards)	600	1,130	530
TS-8B	Cutoff Wall	Lump sum	Lump sum	-0-
TS-10A	30-inch pipe (linear feet)	263	266	-0-
TS-10B	Spillway Structure	Lump sum	Lump sum	-0-
TS-11	48-inch pipe (linear feet)	220	220	-0-
TS-12A	Seeding - No Topsoil (acre)	40	89	-1
TS-12B	Seeding - With Topsoil (acre)	27	25.9	-1.1
TS-12C	Barbed Wire Fence (feet)	14,500	13,655	-0-
Change Order #1 - Seepage Collar and Additional Crest Width		---	Lump sum	---
Change Order #2 - 345 KV Power Line Construction		---	Lump sum	---
Change Order #3 - East Ditch Haul Road Crossing		---	Lump sum	---
Change Order #4 - Seeding		---	Lump sum	---

TABLE 3

INITIAL LOCATIONS OF SETTLEMENT MONUMENTS

Settlement Monument Number	State Plane Coordinate System Y-Coordinate	X-Coordinate	Elevation of Top of Steel Rod Feet, MSL
SMC-1	N 643,827.04	E 3,107,503.43	890.67
SMC-2	N 643,326.58	E 3,107,522.68	890.76
SMC-3	N 642,988.24	E 3,107,536.80	891.11
SMC-4	N 642,682.17	E 3,107,549.29	890.67
SMC-5	N 642,151.57	E 3,106,617.77	890.86
SMC-6	N 641,798.44	E 3,106,309.80	890.99
SMC-7	N 641,087.26	E 3,106,339.23	890.49
SMC-8	N 640,302.56	E 3,106,376.49	890.63

Note: Survey data were obtained by Jonas Engineering Company in December 1979 and January 1980.


LA CYGNE
GENERATING
STATION
KCP&L
Westar Energy
25166 E. 2200 Road


884

Site Name:	**La Cygne Generating Station**	Date:	**21 Sept 2010**
Unit Name:	**Bottom Ash Pond**	Operator's Name:	**Kansas City Power and Light**
Unit I.D.:		Hazard Potential Classification:	**High** ☐ **Significant** ☐ **Low** ☒
	Inspector's Name:	Michael McLaren, Andrew Cueto	

Check the appropriate box below. Provide comments when appropriate. If not applicable or not available, record "N/A". Any unusual conditions or construction practices that should be noted in the comments section. For large diked embankments, separate checklists may be used for different embankment areas. If separate forms are used, identify approximate area that the form applies to in comments.

	Yes	No		Yes	No
1. Frequency of Company's Dam Inspections?	X monthly		18. Sloughing or bulging on slopes?		X
2. Pool elevation (operator records)?	X		19. Major erosion or slope deterioration?		X
3. Decant inlet elevation (operator records)?	X		20. Decant Pipes:		
4. Open channel spillway elevation (operator records)?	N/A		Is water entering inlet, but not exiting outlet?		X
5. Lowest dam crest elevation (operator records)?	852.5'		Is water exiting outlet, but not entering inlet?		X
6. If instrumentation is present, are readings recorded (operator records)?		N/A	Is water exiting outlet flowing clear?	X	
7. Is the embankment currently under construction?		X	21. Seepage (specify location, if seepage carries fines, and approximate seepage rate below):		
8. Foundation preparation (remove vegetation, stumps, topsoil in area where embankment fill will be placed)?		N/A	From underdrain?		X
9. Trees growing on embankment? (If so, indicate largest diameter below)		X	At isolated points on embankment slopes?		X
10. Cracks or scarps on crest?		X	At natural hillside in the embankment area?		X
11. Is there significant settlement along the crest?		X	Over widespread areas?		X
12. Are decant trashracks clear and in place?		N/A	From downstream foundation area?		X
13. Depressions or sinkholes in tailings surface or whirlpool in the pool area?		X	"Boils" beneath stream or ponded water?		X
14. Clogged spillways, groin or diversion ditches?		X	Around the outside of the decant pipe?		X
15. Are spillway or ditch linings deteriorated?		N/A	22. Surface movements in valley bottom or on hillside?		X
16. Are outlets of decant or underdrains blocked?		X	23. Water against downstream toe?		X
17. Cracks or scarps on slopes?		X	24. Were Photos taken during the dam inspection?	X	

Major adverse changes in these items could cause instability and should be reported for further evaluation. Adverse conditions noted in these items should normally be described (extent, location, volume, etc.) in the space below and on the back of this sheet.

Issue #	Comments
1	Pond is incised into ground
2	
3	
4	

Coal Combustion Waste (CCW)

Impoundment Inspection

Impoundment NPDES Permit 1-MC18-PO01 **INSPECTOR** Michael McLaren, Andrew Cueto

Date 21 Sept 2010
Impoundment Name Bottom Ash Pond

Impoundment Company Kansas City Power and Light
EPA Region Region 7

State Agency (Field Office) Address Kansas Department of Health and Environment
Name of Impoundment La Cygne Generating Station Bottom Ash Pond

(Report each impoundment on a separate form under the same Impoundment NPDES Permit number)

New ☒ **Update** ☐

	Yes	No
Is impoundment currently under construction?	☐	☒
Is water or ccw currently being pumped into the impoundment?	☒	☐

IMPOUNDMENT FUNCTION: Settling Basin for Bottom Ash waste

Nearest Downstream Town Name: Osceola, MO

Distance from the impoundment:

Location:

Longitude	38	**DEG**	20	**MIN**	59.88	**SEC**	**W**
Latitude	94	**DEG**	38	**MIN**	48.16	**SEC**	**N**

State KS **County** LINN

	Yes	No
Does a state agency regulate this impoundment?	☒	☐

If So Which State Agency? Kansas Department of Health and Environment

HAZARD POTENTIAL *(In the event the impoundment should fail, the following would occur):*

☒ **LESS THAN LOW HAZARD POTENTIAL:** Failure or misoperation of the dam results in no probable loss of human life or economic or environmental losses.

☐ **LOW HAZARD POTENTIAL:** Dams assigned the low hazard potential classification are those where failure or misoperation results in no probable loss of human life and low economic and/or environmental losses. Losses are principally limited to the owner's property.

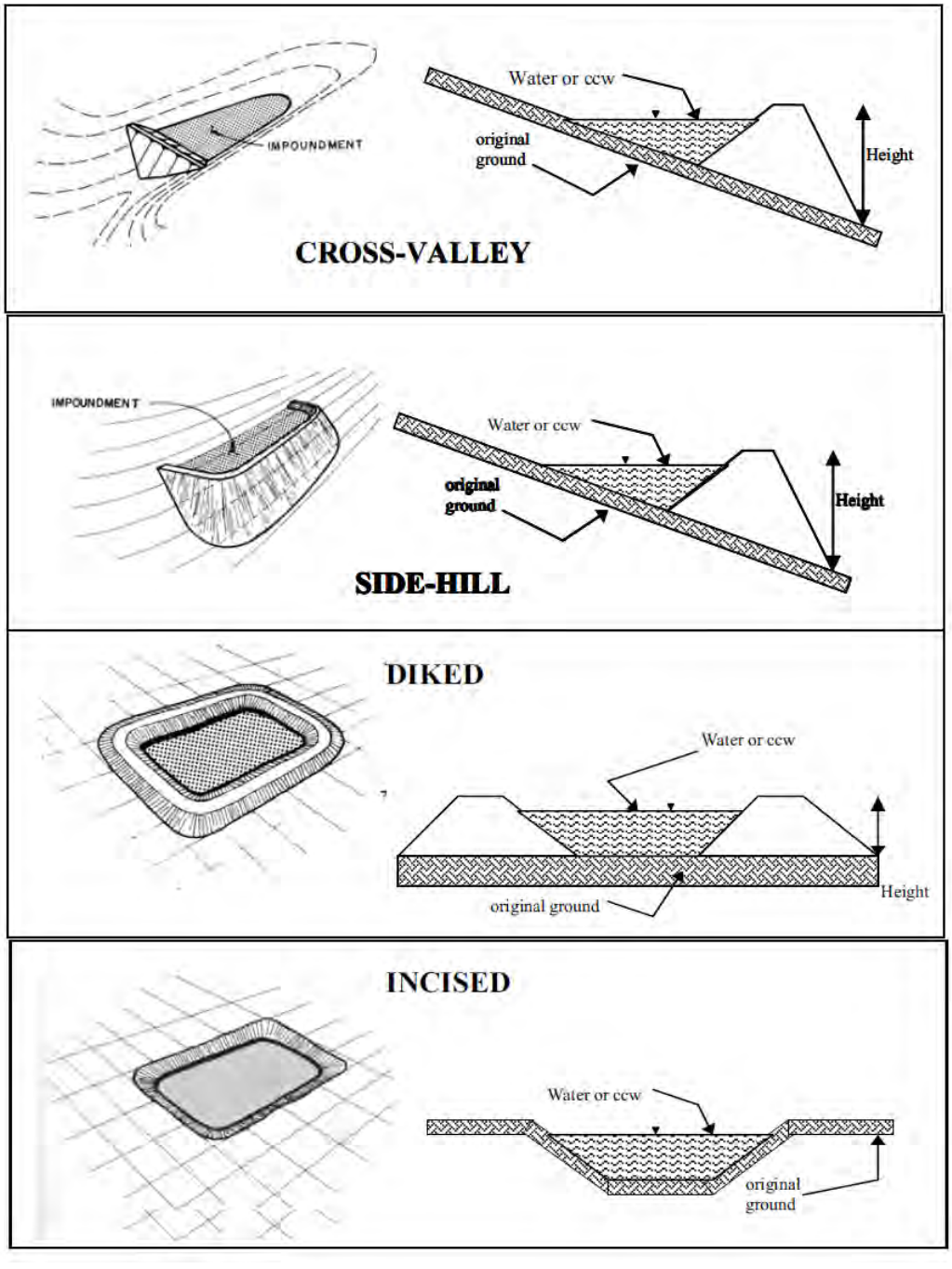
☐ **SIGNIFICANT HAZARD POTENTIAL:** Dams assigned the significant hazard potential classification are those dams where failure or misoperation results in no probable loss of human life but can cause economic loss, environmental damage, disruption of lifeline facilities, or can impact other concerns. Significant hazard potential classification dams are often located in predominantly rural or agricultural areas but could be located in areas with population and significant infrastructure.

☐ **HIGH HAZARD POTENTIAL:** Dams assigned the high hazard potential classification are those where failure or misoperation will probably cause loss of human life.

DESCRIBE REASONING FOR HAZARD RATING CHOSEN:

Pond is incised into ground. No potential for breach and spilling.

CONFIGURATION:



☐ Cross-Valley ☐ Side-Hill ☐ Diked

☒ Incised (form completion optional) ☐ Combination Incised/Diked

Embankment Height (ft)	n/a	**Embankment Material**	n/a
Pool Area (ac)	1.7	**Liner**	clay
Current Freeboard (ft)	3+	**Liner Permeability**	$<10^{-7}$

TYPE OF OUTLET (Mark all that apply)

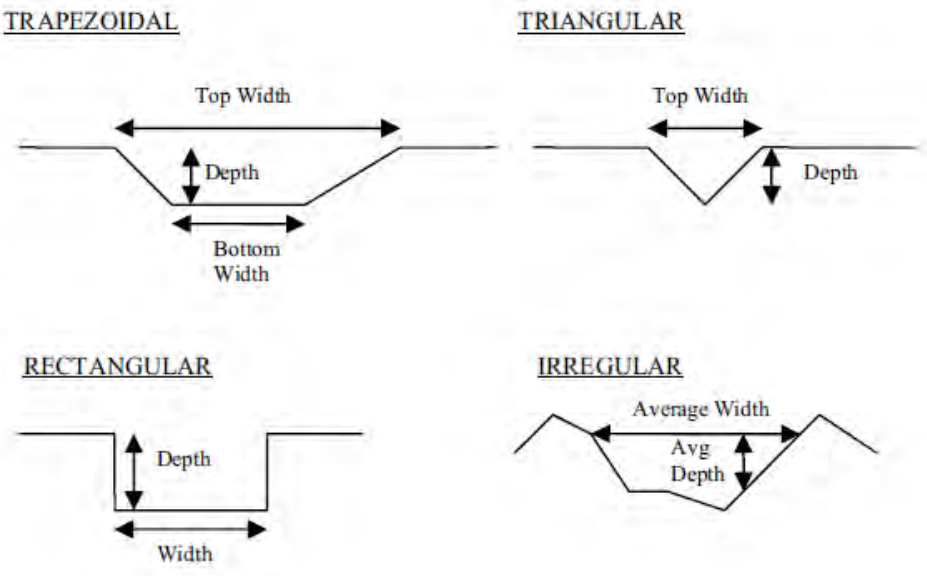
☐ **Open Channel Spillway**

- ☐ Trapezoidal
- ☐ Triangular
- ☐ Rectangular
- ☐ Irregular

depth (ft)

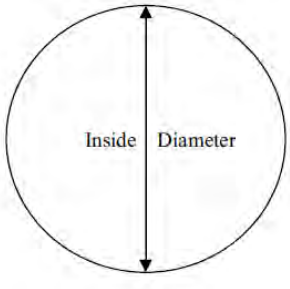
average bottom width (ft)

top width (ft)



☒ **Outlet**

24” inside diameter



Material

- ☐ corrugated metal
- ☐ welded steel
- ☒ concrete
- ☐ plastic (hdpe, pvc, etc.)
- ☐ other (specify):

	Yes	No
Is water flowing through the outlet?	☐	☒

- ☐ **No Outlet**
- ☐ **Other Type of Outlet** (specify):

The Impoundment was Designed By **KCPL staff – not a P.E**

	Yes	No
Has there ever been a failure at this site?	☐	☒

If So When?

If So Please Describe :

	Yes	No
Has there ever been significant seepages at this site?	☐	☒
If So When?		

If So Please Describe :

	Yes	No
Has there ever been any measures undertaken to monitor/lower Phreatic water table levels based on past seepages or breaches at this site?	☐	☒
If so, which method (e.g., piezometers, gw pumping,...)?		

If So Please Describe :

Pond is incised.

ADDITIONAL INSPECTION QUESTIONS

Concerning the embankment foundation, was the embankment construction built over wet ash, slag, or other unsuitable materials? If there is no information just note that.

n/a– incised pond

Did the dam assessor meet with, or have documentation from, the design Engineer-of-Record concerning the foundation preparation?

n/a – no foundation – incised pond

From the site visit or from photographic documentation, was there evidence of prior releases, failures, or patchwork on the dikes?

n/a– incised pond

Site Name:	**La Cygne Generating Station**	Date:	**21 Sept 2010**
Unit Name:	**Lower AQC Pond**	Operator's Name:	**Kansas City Power and Light**
Unit I.D.:		Hazard Potential Classification:	**High** ☐ **Significant** ☐ **Low** ☒
	Inspector's Name:	Michael McLaren, Andrew Cueto	

Check the appropriate box below. Provide comments when appropriate. If not applicable or not available, record "N/A". Any unusual conditions or construction practices that should be noted in the comments section. For large diked embankments, separate checklists may be used for different embankment areas. If separate forms are used, identify approximate area that the form applies to in comments.

	Yes	No		Yes	No
1. Frequency of Company's Dam Inspections?	X monthly		18. Sloughing or bulging on slopes?		X
2. Pool elevation (operator records)?	X		19. Major erosion or slope deterioration?		X
3. Decant inlet elevation (operator records)?	X		20. Decant Pipes:		
4. Open channel spillway elevation (operator records)?	861'		Is water entering inlet, but not exiting outlet?		X
5. Lowest dam crest elevation (operator records)?	864'		Is water exiting outlet, but not entering inlet?		X
6. If instrumentation is present, are readings recorded (operator records)?		X	Is water exiting outlet flowing clear?	X	
7. Is the embankment currently under construction?		X	21. Seepage (specify location, if seepage carries fines, and approximate seepage rate below):		
8. Foundation preparation (remove vegetation, stumps, topsoil in area where embankment fill will be placed)?	X		From underdrain?		X
9. Trees growing on embankment? (If so, indicate largest diameter below)		X	At isolated points on embankment slopes?		X
10. Cracks or scarps on crest?		X	At natural hillside in the embankment area?		X
11. Is there significant settlement along the crest?		X	Over widespread areas?		X
12. Are decant trashracks clear and in place?		N/A	From downstream foundation area?		X
13. Depressions or sinkholes in tailings surface or whirlpool in the pool area?		X	"Boils" beneath stream or ponded water?		X
14. Clogged spillways, groin or diversion ditches?		X	Around the outside of the decant pipe?		X
15. Are spillway or ditch linings deteriorated?		X	22. Surface movements in valley bottom or on hillside?		X
16. Are outlets of decant or underdrains blocked?		X	23. Water against downstream toe?		X
17. Cracks or scarps on slopes?		X	24. Were Photos taken during the dam inspection?	X	

Major adverse changes in these items could cause instability and should be reported for further evaluation. Adverse conditions noted in these items should normally be described (extent, location, volume, etc.) in the space below and on the back of this sheet.

Issue #	Comments
1	
2	
3	
4	

Coal Combustion Waste (CCW)

Impoundment Inspection

Impoundment NPDES Permit n/a **INSPECTOR** Michael McLaren, Andrew Cueto

Date 21 Sept 2010
Impoundment Name Lower AQC Pond

Impoundment Company Kansas City Power and Light
EPA Region Region 7

State Agency (Field Office) Address Kansas Department of Health and Environment
Name of Impoundment La Cygne Generating Station Lower AQC Pond

(Report each impoundment on a separate form under the same Impoundment NPDES Permit number)

New ☒ **Update** ☐

	Yes	No
Is impoundment currently under construction?	☐	☒
Is water or ccw currently being pumped into the impoundment?	☒	☐

IMPOUNDMENT FUNCTION: Water storage

Nearest Downstream Town Name: Osceola, MO

Distance from the impoundment:

Location:

Longitude	38	**DEG**	21	**MIN**	22.57	**SEC**	**W**
Latitude	94	**DEG**	38	**MIN**	18.20	**SEC**	**N**

State KS **County** LINN

	Yes	No
Does a state agency regulate this impoundment?	☒	☐

If So Which State Agency? Kansas Department of Health and Environment

HAZARD POTENTIAL *(In the event the impoundment should fail, the following would occur):*

☐ **LESS THAN LOW HAZARD POTENTIAL:** Failure or misoperation of the dam results in no probable loss of human life or economic or environmental losses.

☒ **LOW HAZARD POTENTIAL:** Dams assigned the low hazard potential classification are those where failure or misoperation results in no probable loss of human life and low economic and/or environmental losses. Losses are principally limited to the owner's property.

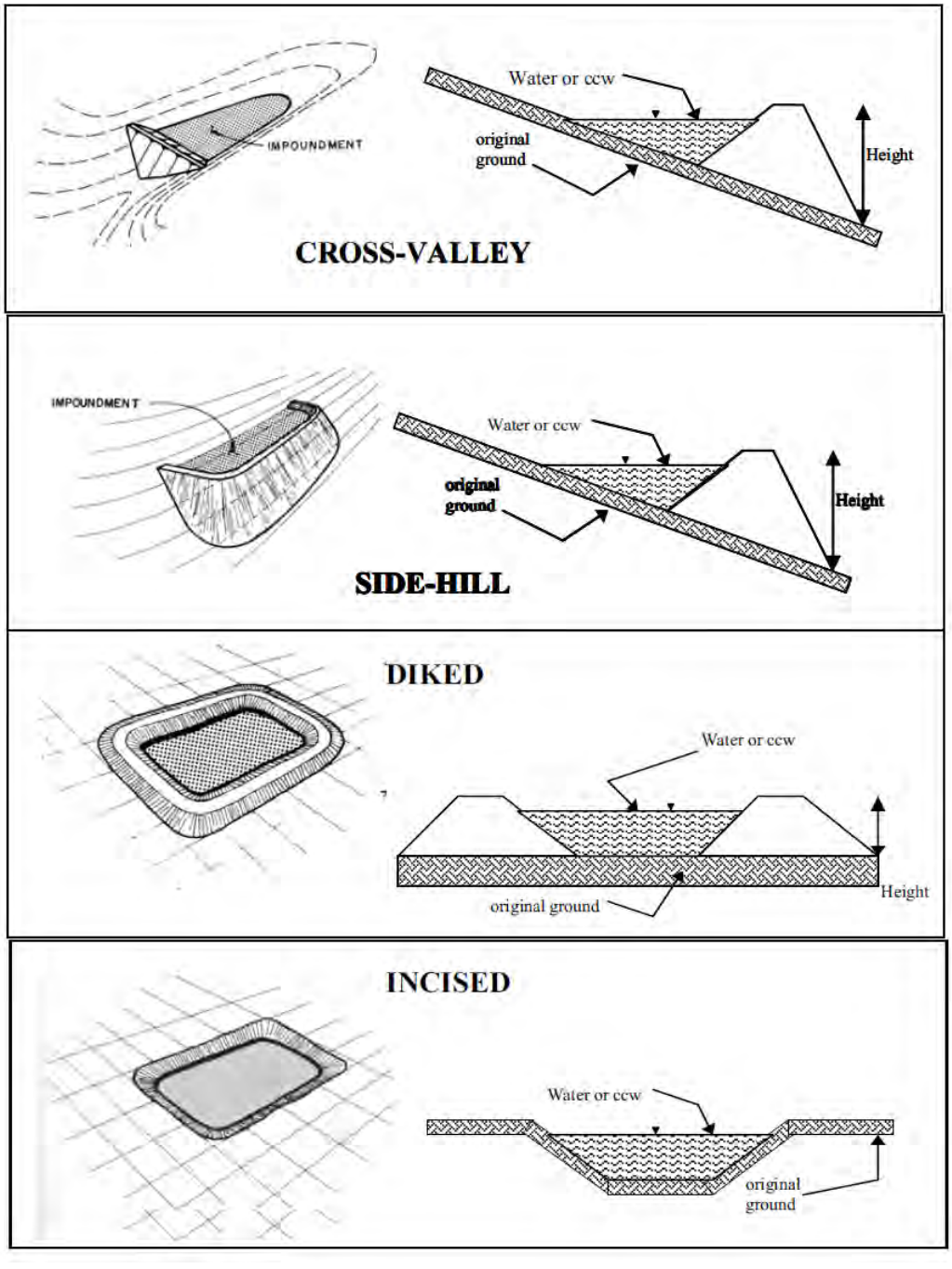
☐ **SIGNIFICANT HAZARD POTENTIAL:** Dams assigned the significant hazard potential classification are those dams where failure or misoperation results in no probable loss of human life but can cause economic loss, environmental damage, disruption of lifeline facilities, or can impact other concerns. Significant hazard potential classification dams are often located in predominantly rural or agricultural areas but could be located in areas with population and significant infrastructure.

☐ **HIGH HAZARD POTENTIAL:** Dams assigned the high hazard potential classification are those where failure or misoperation will probably cause loss of human life.

DESCRIBE REASONING FOR HAZARD RATING CHOSEN:

Pond would spill into La Cygne Generating Station Cooling Water lake and be contained within the lake storage. There would be little to no environmental damage and it would be contained on KCPL property.

CONFIGURATION:



☐ Cross-Valley ☒ Side-Hill ☐ Diked

☐ Incised (form completion optional) ☐ Combination Incised/Diked

Embankment Height (ft)	24	**Embankment Material**	Native clay
Pool Area (ac)	163	**Liner**	clay
Current Freeboard (ft)	3+	**Liner Permeability**	$<10^{-7}$

TYPE OF OUTLET (Mark all that apply)

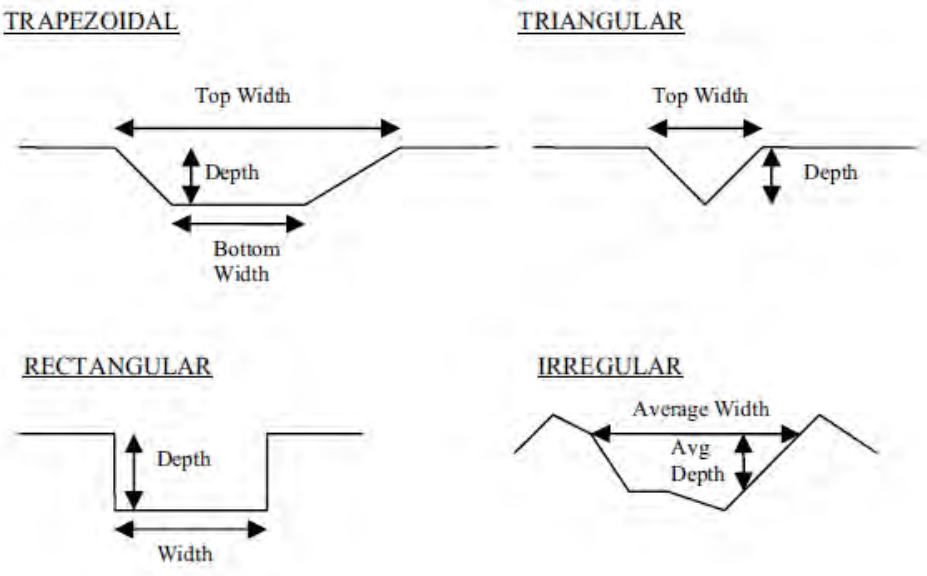
☒ **Open Channel Spillway**

- ☒ Trapezoidal
- ☐ Triangular
- ☐ Rectangular
- ☐ Irregular

2 depth (ft)

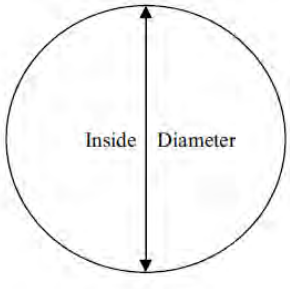
160 average bottom width (ft)

176 top width (ft)



☐ **Outlet**

inside diameter



Material

- ☐ corrugated metal
- ☐ welded steel
- ☐ concrete
- ☐ plastic (hdpe, pvc, etc.)
- ☐ other (specify):

	Yes	No
Is water flowing through the outlet?	☐	☒

☐ **No Outlet**

☐ **Other Type of Outlet** (specify):

The Impoundment was Designed By **Black and Veatch – designed by a P.E.**

	Yes	No
Has there ever been a failure at this site?	☐	☒

If So When?

If So Please Describe :

	Yes	No
Has there ever been significant seepages at this site?	☐	☒
If So When?		

If So Please Describe :

	Yes	No
Has there ever been any measures undertaken to monitor/lower Phreatic water table levels based on past seepages or breaches at this site?	☐	☒
If so, which method (e.g., piezometers, gw pumping,...)?		

If So Please Describe :

ADDITIONAL INSPECTION QUESTIONS

Concerning the embankment foundation, was the embankment construction built over wet ash, slag, or other unsuitable materials? If there is no information just note that.

No. Pond embankment was structurally designed and keyed into native soils that were cleared and grubbed.

Did the dam assessor meet with, or have documentation from, the design Engineer-of-Record concerning the foundation preparation?

Drawings were provided from Engineer-of-Record.

From the site visit or from photographic documentation, was there evidence of prior releases, failures, or patchwork on the dikes?

No.

Site Name:	**La Cygne Generating Station**	Date:	**21 Sept 2010**
Unit Name:	**Upper AQC Pond**	Operator's Name:	**Kansas City Power and Light**
Unit I.D.:		Hazard Potential Classification:	**High** ☐ **Significant** ☐ **Low** ☒
	Inspector's Name:	Michael McLaren, Andrew Cueto	

Check the appropriate box below. Provide comments when appropriate. If not applicable or not available, record "N/A". Any unusual conditions or construction practices that should be noted in the comments section. For large diked embankments, separate checklists may be used for different embankment areas. If separate forms are used, identify approximate area that the form applies to in comments.

	Yes	No		Yes	No
1. Frequency of Company's Dam Inspections?	X monthly		18. Sloughing or bulging on slopes?		X
2. Pool elevation (operator records)?	X		19. Major erosion or slope deterioration?		X
3. Decant inlet elevation (operator records)?	X		20. Decant Pipes:		
4. Open channel spillway elevation (operator records)?	n/a		Is water entering inlet, but not exiting outlet?		X
5. Lowest dam crest elevation (operator records)?	890'		Is water exiting outlet, but not entering inlet?		X
6. If instrumentation is present, are readings recorded (operator records)?		X	Is water exiting outlet flowing clear?	X	
7. Is the embankment currently under construction?		X	21. Seepage (specify location, if seepage carries fines, and approximate seepage rate below):		
8. Foundation preparation (remove vegetation, stumps, topsoil in area where embankment fill will be placed)?	X		From underdrain?		X
9. Trees growing on embankment? (If so, indicate largest diameter below)	X 1.0"-1.5" Saltceder (Tamarix Aphylla)		At isolated points on embankment slopes?		X
10. Cracks or scarps on crest?		X	At natural hillside in the embankment area?		X
11. Is there significant settlement along the crest?		X	Over widespread areas?		X
12. Are decant trashracks clear and in place?		N/A	From downstream foundation area?		X
13. Depressions or sinkholes in tailings surface or whirlpool in the pool area?		X	"Boils" beneath stream or ponded water?		X
14. Clogged spillways, groin or diversion ditches?		X	Around the outside of the decant pipe?		X
15. Are spillway or ditch linings deteriorated?		N/A	22. Surface movements in valley bottom or on hillside?		X
16. Are outlets of decant or underdrains blocked?		X	23. Water against downstream toe?		X
17. Cracks or scarps on slopes?		X	24. Were Photos taken during the dam inspection?	X	

Major adverse changes in these items could cause instability and should be reported for further evaluation. Adverse conditions noted in these items should normally be described (extent, location, volume, etc.) in the space below and on the back of this sheet.

Issue #	Comments
1	
2	
3	
4	

Coal Combustion Waste (CCW)

Impoundment Inspection

Impoundment NPDES Permit n/a **INSPECTOR** Michael McLaren, Andrew Cueto

Date 21 Sept 2010
Impoundment Name Upper AQC Pond

Impoundment Company Kansas City Power and Light
EPA Region Region 7

State Agency (Field Office) Address Kansas Department of Health and Environment
Name of Impoundment La Cygne Generating Station Lower AQC Pond

(Report each impoundment on a separate form under the same Impoundment NPDES Permit number)

New ☒ **Update** ☐

	Yes	No
Is impoundment currently under construction?	☐	☒
Is water or ccw currently being pumped into the impoundment?	☒	☐

IMPOUNDMENT FUNCTION: Settling Pond

Nearest Downstream Town Name: Osceola, MO

Distance from the impoundment:

Location:

Longitude	38	**DEG**	22	**MIN**	10.65	**SEC**	**W**
Latitude	94	**DEG**	38	**MIN**	02.13	**SEC**	**N**

State KS **County** LINN

	Yes	No
Does a state agency regulate this impoundment?	☒	☐

If So Which State Agency? Kansas Department of Health and Environment

HAZARD POTENTIAL *(In the event the impoundment should fail, the following would occur):*

☐ **LESS THAN LOW HAZARD POTENTIAL:** Failure or misoperation of the dam results in no probable loss of human life or economic or environmental losses.

☒ **LOW HAZARD POTENTIAL:** Dams assigned the low hazard potential classification are those where failure or misoperation results in no probable loss of human life and low economic and/or environmental losses. Losses are principally limited to the owner's property.

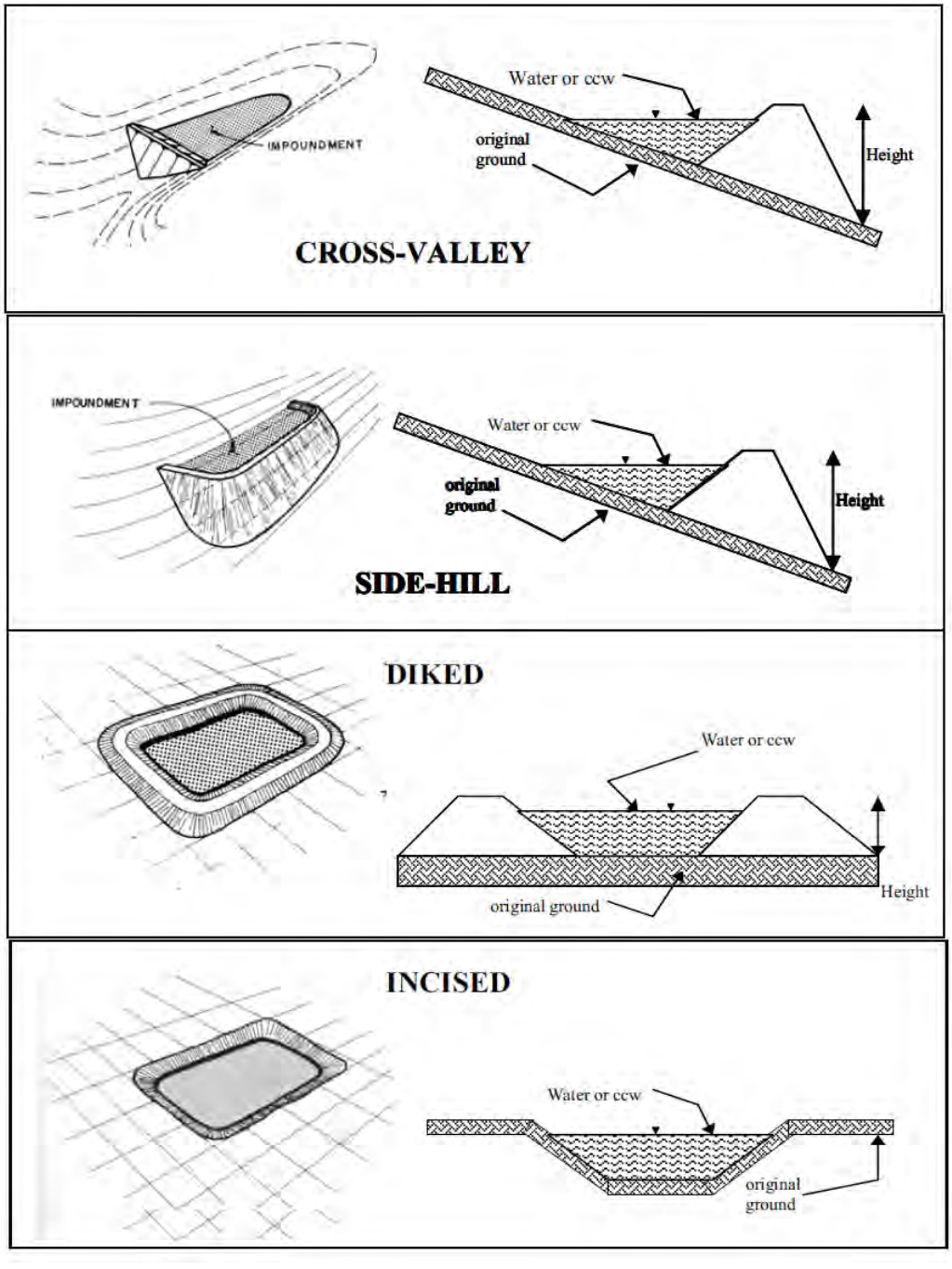
☐ **SIGNIFICANT HAZARD POTENTIAL:** Dams assigned the significant hazard potential classification are those dams where failure or misoperation results in no probable loss of human life but can cause economic loss, environmental damage, disruption of lifeline facilities, or can impact other concerns. Significant hazard potential classification dams are often located in predominantly rural or agricultural areas but could be located in areas with population and significant infrastructure.

☐ **HIGH HAZARD POTENTIAL:** Dams assigned the high hazard potential classification are those where failure or misoperation will probably cause loss of human life.

DESCRIBE REASONING FOR HAZARD RATING CHOSEN:

Pond would spill into La Cygne Generating Station Cooling Water lake and be contained within the lake storage. There would be little to no environmental damage and it would be contained on KCPL property.

CONFIGURATION:



☐ Cross-Valley ☐ Side-Hill ☒ Diked

☐ Incised (form completion optional) ☐ Combination Incised/Diked

Embankment Height (ft)	45	**Embankment Material**	Native clay
Pool Area (ac)	332	**Liner**	clay
Current Freeboard (ft)	3+	**Liner Permeability**	$<10^{-7}$

TYPE OF OUTLET (Mark all that apply)

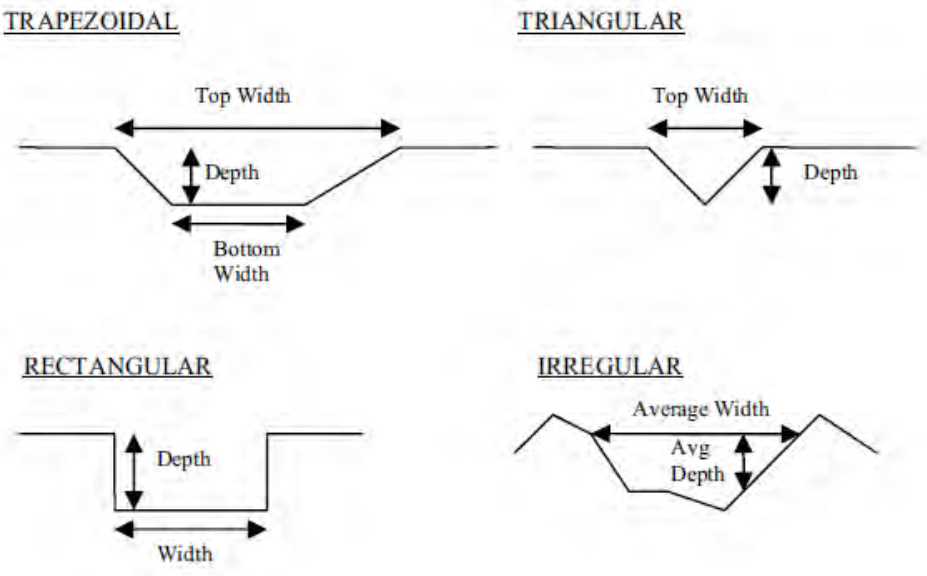
☐ **Open Channel Spillway**

- ☐ Trapezoidal
- ☐ Triangular
- ☐ Rectangular
- ☐ Irregular

depth (ft)

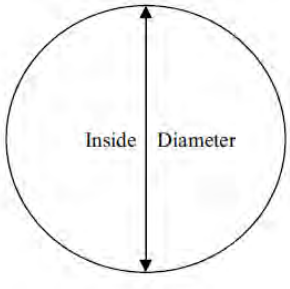
average bottom width (ft)

top width (ft)



☒ **Outlet**

48” sharp crested weir



Material

- ☐ corrugated metal
- ☐ welded steel
- ☐ concrete
- ☐ plastic (hdpe, pvc, etc.)
- ☐ other (specify):

	Yes	No
Is water flowing through the outlet?	☐	☒

- ☐ **No Outlet**
- ☒ **Other Type of Outlet** (specify):

The Impoundment was Designed By **Black and Veatch – designed by a P.E.**

	Yes	No
Has there ever been a failure at this site?	☐	☒

If So When?

If So Please Describe :

	Yes	No
Has there ever been significant seepages at this site?	☐	☒
If So When?		

If So Please Describe :

	Yes	No
Has there ever been any measures undertaken to monitor/lower Phreatic water table levels based on past seepages or breaches at this site?	☐	☒
If so, which method (e.g., piezometers, gw pumping,...)?		

If So Please Describe :

ADDITIONAL INSPECTION QUESTIONS

Concerning the embankment foundation, was the embankment construction built over wet ash, slag, or other unsuitable materials? If there is no information just note that.

No. Pond embankment was structurally designed and keyed into native soils that were cleared and grubbed.

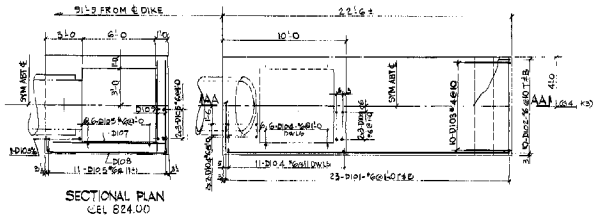
Did the dam assessor meet with, or have documentation from, the design Engineer-of-Record concerning the foundation preparation?

Drawings were provided from Engineer-of-Record.

From the site visit or from photographic documentation, was there evidence of prior releases, failures, or patchwork on the dikes?

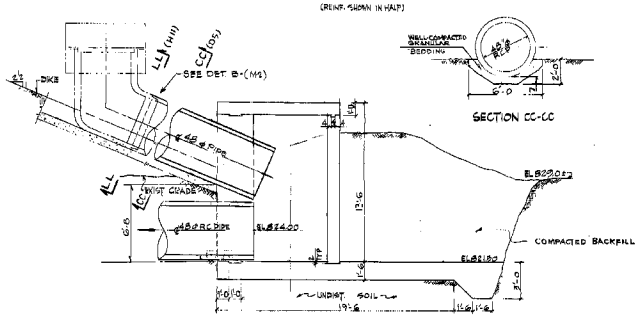
No.

AN 8980 G-694

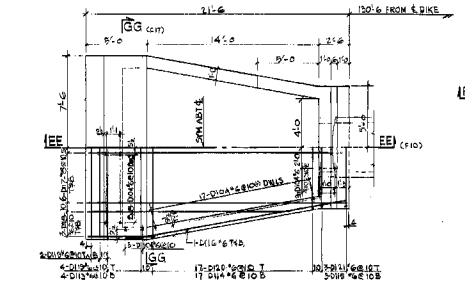


SECTIONAL PLAN
EL 824.00

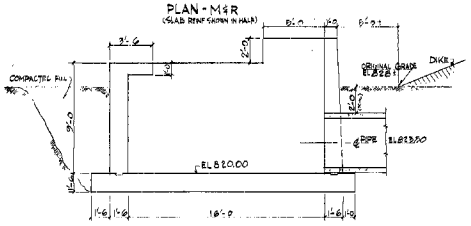
PLAN - M&R
(REINF. SHOWN IN HALF)



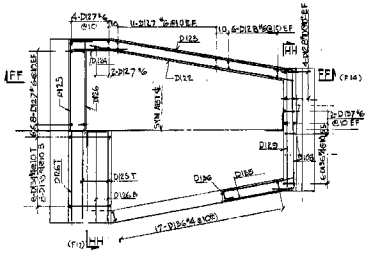
SECTION AA-AA - MAS (B6)



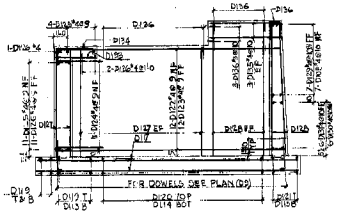
PLAN - M&R
(SLAB REINF SHOWN IN HALF)



SECTION EE-EE (B11)

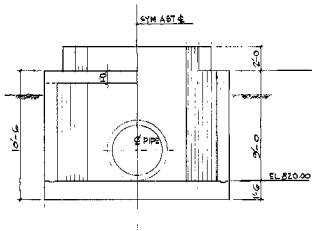


PLAN - WALL & TOP REINF (REINF SHOWN IN HALF)

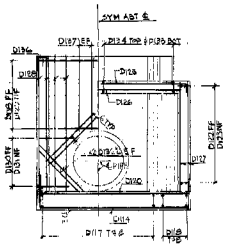


SECTION FF-FF (B15)

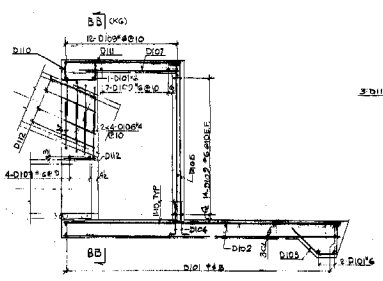
DET 'C' (2 REQ'D)



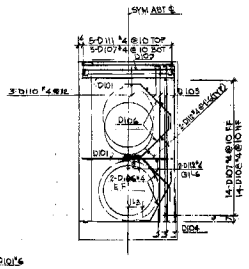
SECTION GG-GG (A6)



SECTION HH-HH

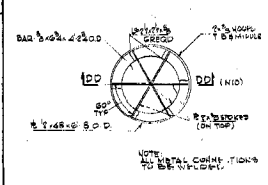


SECTION AA-AA - REINF (B6)

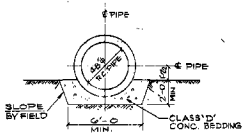


SECTION BB-BB (G6)

DET 'A' (2 REQ'D)

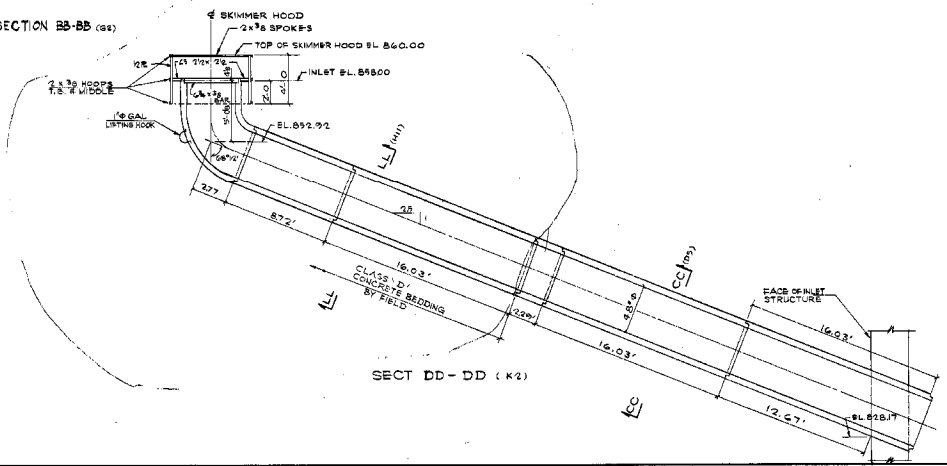


PLAN
DET 'B' (2 REQ'D.)



SECT LL-LL

NOTE:
FOR LOCATION & ORIENTATION OF DETAILS 'A', 'B' AND 'C' SEE SECT. "D-D" ON DWG. G-695



SECT DD-DD (K2)

QUANTITIES (NET BY FIELD U.N.)
FOR REINF STL SEE BAR BENDING SCHEDULE B-941-1G

CONC. CLASS "B" (3000 PSI)	(B6 CU YDS
SKIMMER WOOD AS PER DET B (M²)	2 REQ'D
48" R.C. CYLINDER PIPE :	—
STD. LGTH. STR. PIPE (L.L. = 16.08')	(6 REQ'D
SHORT LGTH STR. PIPE (L.L. = 2.29')	2 REQ'D
66"ϕ 12 ELBOW (S = 2.77', B = 5.08')	2 REQ'D
SHORT LGTH STR. PIPE (L.L. = 8.72')	2 REQ'D

NOTES (NET BY FIELD UNLESS NOTED)

CONCRETE SHALL BE CLASS "B" (3000 PSI)
SEE SPECIFICATION EBASCO 14-69 CONCRETE MASONRY

ALL ANCHOR BOLTS, DRAIN PIPES, PIPE SLEEVES, ELECTRICAL CONDUITS AND EMBEDDED PARTS SHALL BE IN POSITION BEFORE CONCRETE IS PLACED.

FOR SPECIFICATIONS FOR STEEL FOR CONCRETE REINFORCING BARS AND FOR BAR DETAILS SEE BAR BENDING SCHEDULE.

PLACING DIMENSIONS ARE GIVEN TO CENTER OF BARS UNLESS NOTED.

ALL SPLICES IN REINFORCEMENT SHALL COMPLY WITH THE REQUIREMENTS OF CURRENT ACI STANDARD, SECTION 805, BUT IN NO CASE SHALL LAP BE LESS THAN 24 BAR DIAMETERS.

ALL BARS SHALL HAVE 2" MINIMUM CONCRETE COVER UNLESS OTHERWISE NOTED.

SHIFT OR BEND BARS TO CLEAR ANCHOR BOLTS, DRAINS, PIPE SLEEVES AND EMBEDDED PARTS.

PIPE LAID ON SLOPE OF DIKE SHALL BE R.C. CYLINDER PIPE WITH RUBBER & STEEL JT. STR. PIPE SHALL BE INTERFACE SP-1 HEAVY CONC. SPEC. AWWA C301 OR EQUAL. ELBOWS SHALL BE INTERFACE SP-1 TYPE 'A' SPEC. AWWA C-302 OR EQUAL.

REFERENCE DRAWINGS AN 8980-

LIST OF DRAWINGS	A-16V
ASH POND DIKE PLAN & SECT	B-675
BAR BENDING SCHEDULE	B-941-1G

WORK THIS DRAWING WITH DWG G-693

KANSAS CITY POWER & LIGHT COMPANY
KANSAS GAS AND ELECTRIC COMPANY
LA CYGNE STEAM ELECTRIC STATION
1973-846 MW (NET) INSTALLATION - UNIT NO. 1

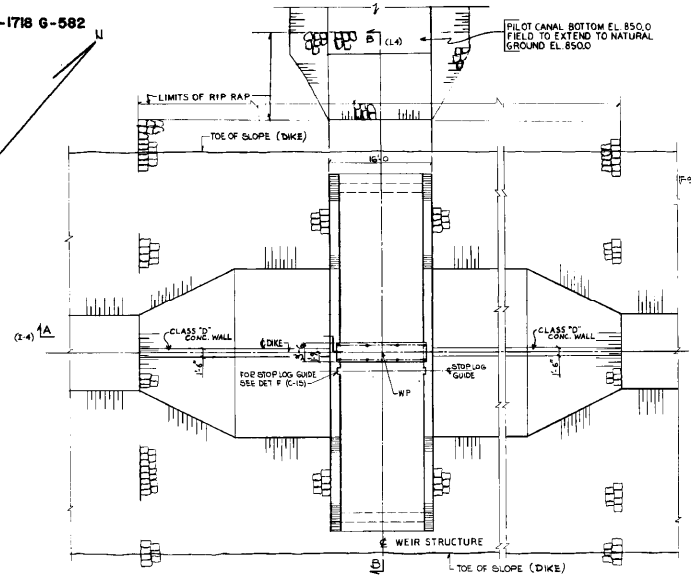
ASH POND DIKE DETS - MAS & REINF

EBASCO SERVICES INCORPORATED NEW YORK

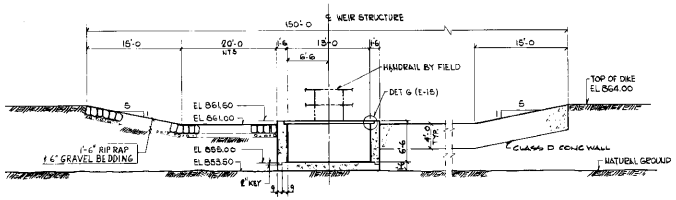
NO.	DATE	REVISION	BY	CH.	APPROVED
1	3-17-71	REV. 1 (M2) SECT DD-DD, (H2) QTY. ADD 1 (H10) SECT LL-LL	J.S.	W.H.	

APPROVED
SCALE 1/4"=1'-0
DIV. C-H
DR. Schneider
CH. P.A.S.L.
DATE
AN 8980
G-694

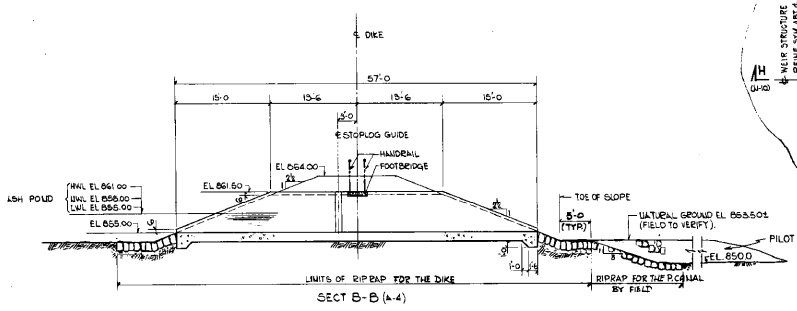
AN-1718 G-582



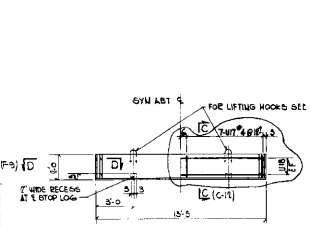
PLAN - FOR LOCATION SEE KEY PLAN (K-16)



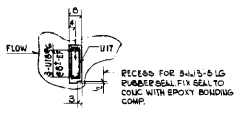
SECT A-A (D-1)



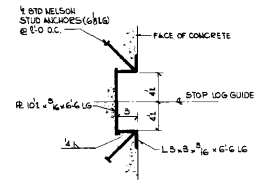
SECT B-B (A-4)



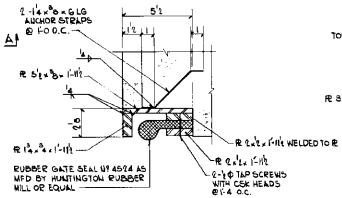
STOP LOG DET
(3 REQ'D)
½"=1'-0

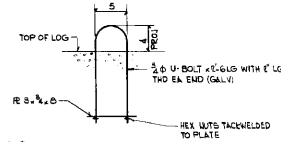


SECT C-C (B-9)
3/8"=1'-0

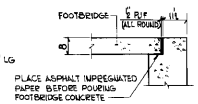


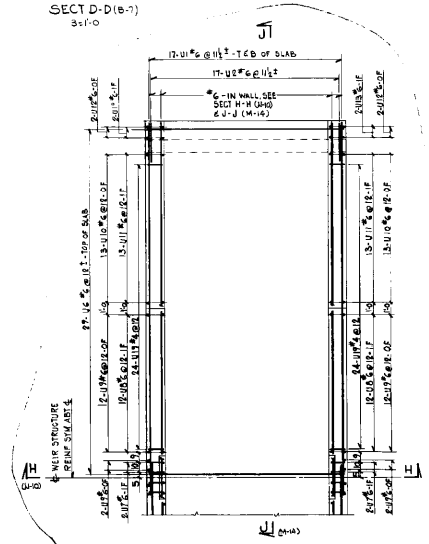
DET F (D-8)
1½"=1'-0



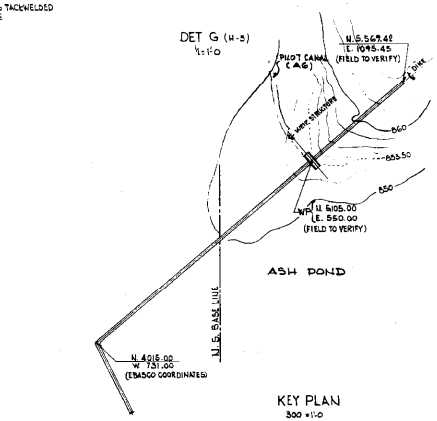


DET E (A-10)
1½"=1'-0

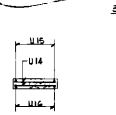




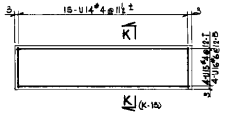
PLAN-REINF
¼"=1'-0



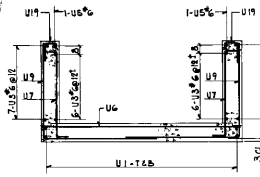
KEY PLAN
300 ="=1'-0



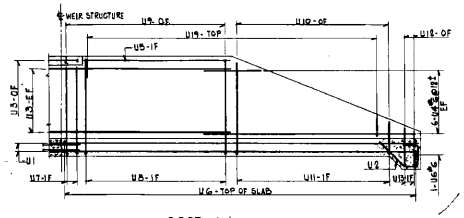
SECT K-K (K-15)
¼"=1'-0



FOOTBRIDGE PLAN - REINF
¼"=1'-0



SECT H-H (J-10)
¼"=1'-0



SECT J-J (K-14)

QUANTITIES (MET BY FIELD, UNLESS NOTED)

CONCRETE CLASS 'B' (3000 PSI); FOR REINF STEEL SEE BAR BENDING SCHEDULE B-535-20	86 CU YD
RIP-RAP	250 CU YD
GRAVEL	200 CU YD
STOP LOGS AS PER DETAIL (C-9)	3 REQ'D
STOP LOG GUIDES AS PER DETAIL F (D-15)	2 REQ'D
HANDRAIL	BY FIELD
¾ PREMOLDED JOINT FILLER	5 SQ.FT.
CONCRETE CLASS 'D' (2000 PSI)	30 CU YD.

NOTES

CURRENT ACI STANDARDS SHALL GOVERN FOR ALL DESIGN AND CONSTRUCTION UNLESS OTHERWISE NOTED.

CONCRETE SHALL BE CLASS B' (3000 PSI) & CLASS D' (2000 PSI) SEE SPECIFICATION EBASCO 14-6S CONC - MAS

ALL ANCHOR BOLTS, DRAIN PIPES, PIPE SLEEVES, ELECTRICAL CONDUITS AND EMBEDDED PARTS SHALL BE IN POSITION BEFORE CONCRETE IS PLACED.

FOR SPECIFICATIONS FOR STEEL FOR CONCRETE REINFORCING BARS AND FOR BAR DETAILS SEE BAR BENDING SCHEDULE B-535-20

PLACING DIMENSIONS ARE GIVEN TO CENTER OF BARS UNLESS NOTED.

ALL SPLICES IN REINFORCEMENT SHALL COMPLY WITH THE REQUIREMENTS OF CURRENT ACI STANDARDS, SECTION 805, BUT IN NO CASE SHALL LAP BE LESS THAN 24 BAR DIAMETERS.

ALL BARS SHALL HAVE 2" MINIMUM CONCRETE COVER UNLESS OTHERWISE NOTED.

SHIFT OR BEND BARS TO CLEAR ANCHOR BOLTS, DRAINS PIPE SLEEVES AND EMBEDDED PARTS.

ALL EXPOSED STEEL TO BE HOT DIP GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH ASA SPEC G8.1 (ASTM A 123)

ALL MATERIAL FOR STOP LOGS TO BE FURNISHED BY FIELD

BACKFILL TO BE SELECT MATERIAL THOROUGHLY COMPACTED TO 95% STD PROCTOR DENSITY FOR THE WEIR STR.

WEIR STRUCTURE LESS STOPLOGS, DESIGNED FOR 100 YEAR FLOOD CONDITION (210 CFS)

DEPRESSED SECTION DESIGNED FOR MAXIMUM PROBABLE FLOOD CONDITION (1305 CFS)

NORMAL OPERATING CONDITION - 2 STOPLOGS IN PLACE

REFERENCE DRAWINGS

LIST OF DRAWINGS	A-557
BAR BENDING SCHEDULE	B-535-20
ASH POND DIKE - PLAN & SECTIONS	B950-S-695

LA CYGNE STATION
AIR QUALITY CONTROL
AQC STRUCTURAL
MISCELLANEOUS ASH POND WEIR STRUCTURE M&R DIAGRAM

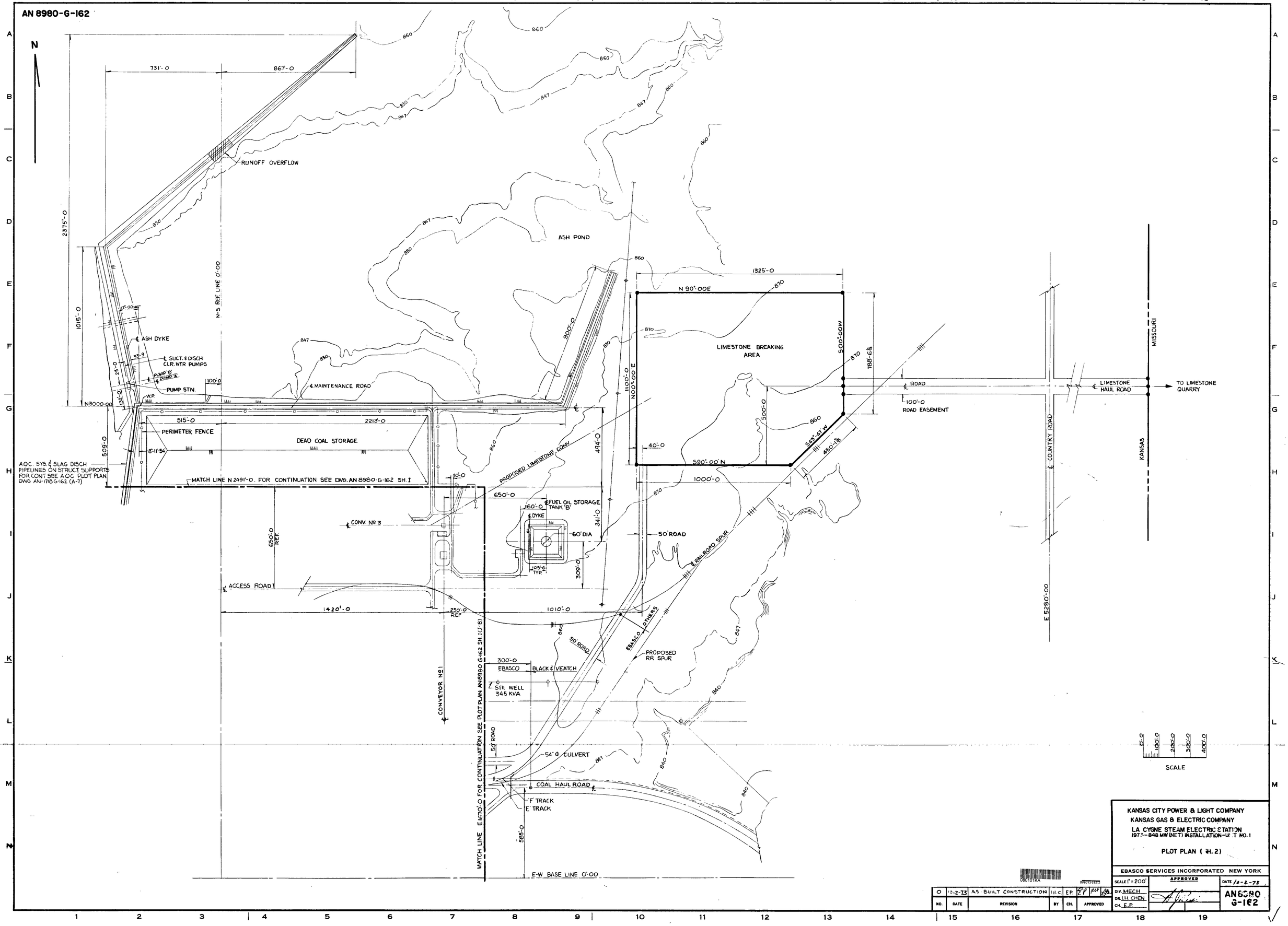
	DATE	APPROVED	DATE
DRAWN ESI	12/28/71	ESI	12/28/71
CHECKED	DATE	SCALE	
SUPER. OK.	DATE	JOB NO. 1718	

KANSAS CITY POWER & LIGHT COMPANY

DRAWING NO. 1718 G582

REV.	REVISION	BY	CK.	APP.

AN 8980-G-162



KANSAS CITY POWER & LIGHT COMPANY
KANSAS GAS & ELECTRIC COMPANY
LA CYGNE STEAM ELECTRIC STATION
1973-848 MW (NET) INSTALLATION-UNIT NO. 1

PLOT PLAN (H. 2)

EBASCO SERVICES INCORPORATED NEW YORK

NO.	DATE	REVISION	BY	CH.	APPROVED
0	10-2-73	AS BUILT CONSTRUCTION	I.H.C	E.P	EP

SCALE 1"=200' | APPROVED | DATE 10-2-73
DIV. MECH
DR. I.H. CHEN
CH. E.P
AN8980 G-162

EXISTING SLUDGE RETENTION DAM CREST EL. APPROX. 865.0

EXISTING PUMP STATION FOR RECIRCULATION

EXISTING SLUDGE POND

HAUL ROAD

NOTES:

1. TOPOGRAPHIC DATA SHOWN ON THIS DRAWING WAS TAKEN FROM DRAWINGS AND DATA PREPARED FROM AERIAL PHOTOGRAPHY TAKEN APRIL 26, 1978 FOR KANSAS CITY POWER AND LIGHT BY WESTERN AIR MAPS, INC.
2. ELEVATIONS REFERENCED TO USC AND GS DATUM.
3. CREST ELEVATION ON STAGE 1 DAM IS 890.0.
4. EXISTING POWER LINE TO BE RAISED BY OWNER.
5. TOPOGRAPHIC CONTOURS SHOWN REPRESENT EXISTING CONDITIONS.
6. CONTOURS AT 2-FOOT INTERVALS.

TERMINATE NEW FENCE AT DISCHARGE CANAL

APPROXIMATE LOCATION OF COOLING WATER DISCHARGE CANAL

NORMAL MAXIMUM RESERVOIR LEVEL (STAGE 1) EL. 885.8

EMERGENCY SPILLWAY CREST EL. 887.0

DAM CREST (STAGE 1) EL. 890.0

TEMPORARY SPOIL MATERIAL DIKE AS REQUIRED TO DEWATER DAM FOUNDATION

APPROX LOCATION NEW FENCE

APPROXIMATE LOCATION OF NORTH DIVERSION DITCH

SERVICE SPILLWAY

LOCATION OF STAGE 2 STARTER DAM

CREST EL. 890.0

PERMANENT ASH DIKE WITH CULVERTS TO BE CONSTRUCTED BY OWNER FOR ACCESS ROAD AND PIPE ALLEY - APPROX. 40' ROAD WIDTH AT TOP ELEV. 870.0'

APPROXIMATE LOCATION OF SLUDGE PIPE FROM PLANT

UNDISTURBED AREA 30' FROM POWER POLES WITH ADJACENT SLOPES 2H to 1V (TYPICAL)

EXISTING OVERHEAD POWER LINE TO BE RAISED BY OWNER

SPOIL MATERIAL DIKE FOR DIVERSION OF SLUDGE

NEW FENCE ALONG COUNTY ROAD

DISCHARGE OF SLUDGE

EXISTING ASH DIKES

APPROXIMATE LOCATION OF SLUDGE PIPE

EXISTING SLUDGE DISPOSAL AREA B

EXISTING SLUDGE DISPOSAL AREA A

COUNTY ROAD

CONTRACTORS WORK AREA

100' (TYP.) SCREEN ZONE

NORTH

0 200 400

SCALE FEET

UNDISTURBED SCREENING ZONE IN CONTRACTORS WORK AREA.

HAUL ROAD

COUNTY ROAD

APPROXIMATE LOCATION OF EAST DIVERSION DITCH

NEW FENCE ALONG COUNTY ROAD (TYPICAL)

APPROVED

20TH day of JANUARY 19 79

Guy E. Gibson by Kevin Becker

Chief Engineer

Division of Water Resources

State Board of Agriculture

DIVISION OF WATER RESOURCES — GUY E. GIBSON — CHIEF ENGINEER — KANSAS STATE BOARD OF AGRICULTURE

NO	DATE	REVISION	BY	CH	APPROVED
1	JAN 79	POWER POLE STANDOFF AND ISSUED FOR CONSTRUCTION	KTM	KJN	KTM
0	DEC 78	ISSUED FOR BIDS	ED	JDC	

KANSAS CITY POWER & LIGHT COMPANY
KANSAS GAS AND ELECTRIC COMPANY
LA CYGNE STEAM ELECTRIC STATION
NEW F.G.D. SLUDGE RETENTION DAM - STAGE 1

SITE PLAN AND GENERAL ARRANGEMENT

WOODWARD-CLYDE CONSULTANTS KANSAS

SCALE AS SHOWN

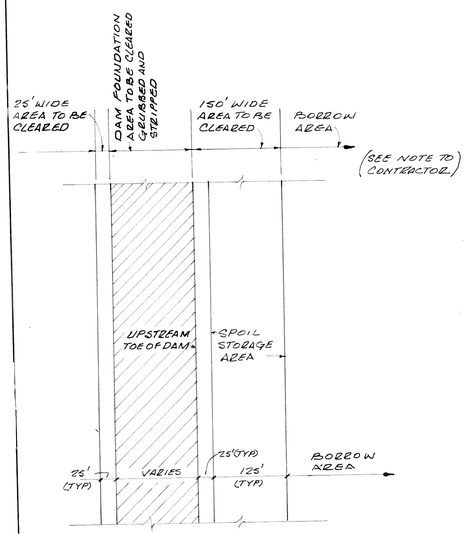
DR ED

CH JDC

APPROVED

NOTES:

1. TOPOGRAPHIC DATA SHOWN ON THIS DRAWING WAS TAKEN FROM DRAWINGS AND DATA PREPARED FROM AERIAL PHOTOGRAPHY TAKEN APRIL 26, 1978 FOR KANSAS CITY POWER AND LIGHT BY WESTERN AIR MAPS, INC.
2. ELEVATIONS REFERENCED TO USC AND GS DATUM.
3. TOPOGRAPHIC CONTOURS SHOWN REPRESENT EXISTING CONDITIONS.
4. CONTOURS AT 2-FOOT INTERVALS.
5. ALL CLEARING, GRUBBING AND STRIPPING SHALL CONFORM TO THE TECHNICAL SPECIFICATIONS.



DETAIL

0 100 200

SCALE FEET

NOTE: TO CONTRACTOR

AREA TO BE CLEARED, GRUBBED AND STRIPPED WHERE BORROW IS OBTAINED.
AREAS NOT USED FOR BORROW TO BE USED FOR SPOIL STORAGE AS APPROVED BY ENGINEER.

TOPSOIL MAY BE STORED OUTSIDE DAM ALIGNMENT AT LOCATIONS APPROVED BY ENGINEER (TYPICAL)

EXCAVATE EXISTING SLUDGE BENEATH DAM FOUNDATION DOWN TO SOUND FOUNDATION SOIL AS APPROVED BY ENGINEER

FOUNDATION FOR ACCESS ROAD TO BE CLEARED AND STRIPPED

SEE NOTE TO CONTRACTOR

SEE DETAIL FOR TYPICAL CONDITIONS

LIMITS OF CLEARING, GRUBBING & STRIPPING

DAM FOUNDATION TO BE CLEARED GRUBBED AND STRIPPED

SPOIL MATERIAL

USE AS TEMPORARY DIKE TO DEWATER DAM FOUNDATION. REMOVE ONLY AS REQUIRED TO PERMIT DRAINAGE

SPOIL AREA

AREA NOT TO BE USED AS PERMANENT SPOIL STORAGE AREA

DEWATER AND STRIP TO SOUND FOUNDATION SOIL AS APPROVED BY ENGINEER (TYPICAL)

LOCATION OF STAGE 2 STARTER DAM

DOMESTIC WELLS TO BE FILLED WITH STRIPPINGS

DW-2

DW-3 DOMESTIC WELL & BASEMENT TO BE FILLED WITH STRIPPINGS

UNDISTURBED AREA 30' FROM POWER POLES WITH ADJACENT SLOPES 2 H to 1 V (TYPICAL)

LIMITS OF CLEARING, GRUBBING & STRIPPING

550'±

UNDISTURBED AREA USED FOR SPOIL STORAGE

220'±

DOMESTIC WELL TO BE FILLED WITH STRIPPINGS

DW-1

SPOIL STORAGE AREA (TYP)

CONTRACTOR'S WORK AREA

90+00 100+00 110+00 120+00 130+00 140+00 150+00 160+00 170+00 180+00 190+00 200+00 10+00 20+00 0+00

N 640,000 N 641,000 N 642,000 N 643,000 N 644,000 N 645,000

E 3109,000 E 3108,000 E 3107,000 E 3106,000 E 3110,000 E 3111,000

NORTH

0 200 400

SCALE FEET

APPROVED

this 30th day of JANUARY 19 79

GUY E. GIBSON
Chief Engineer
Division of Water Resources
State Board of Agriculture

DIVISION OF WATER RESOURCES — GUY E. GIBSON — CHIEF ENGINEER — KANSAS STATE BOARD OF AGRICULTURE

NO	DATE	REVISION	BY	CH	APPROVED
1	JAN 79	CYCLE STANDOFF AND ISSUED FOR CONSTRUCTION	HGR	KEN	
0	DEC 78	ISSUED FOR BIDS	ED	JRC	

KANSAS CITY POWER & LIGHT COMPANY
KANSAS GAS AND ELECTRIC COMPANY
LA CYGNE STEAM ELECTRIC STATION
NEW F.G.D. SLUDGE RETENTION DAM - STAGE 1

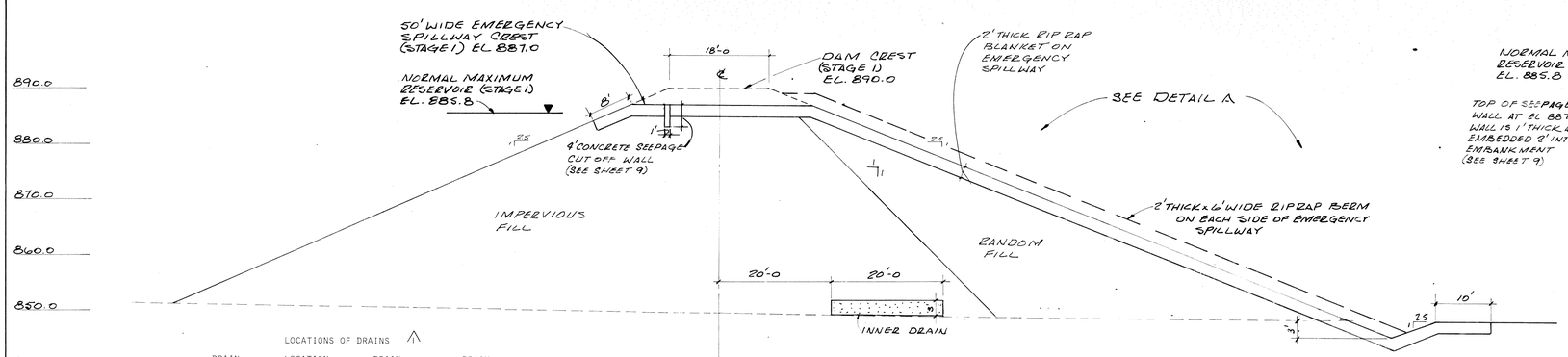
LIMITS OF CLEARING, GRUBBING, STRIPPING AND SPOIL AREAS

WOODWARD-CLYDE CONSULTANTS KANSAS CITY

SCALE AS SHOWN | APPROVED | DATE DEC 1978

DR. ED CH. JRC

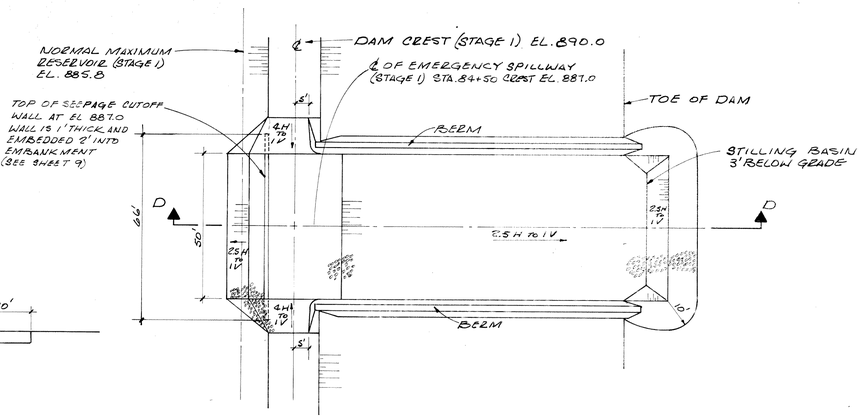
KC 205.80
SHEET 3



LOCATIONS OF DRAINS

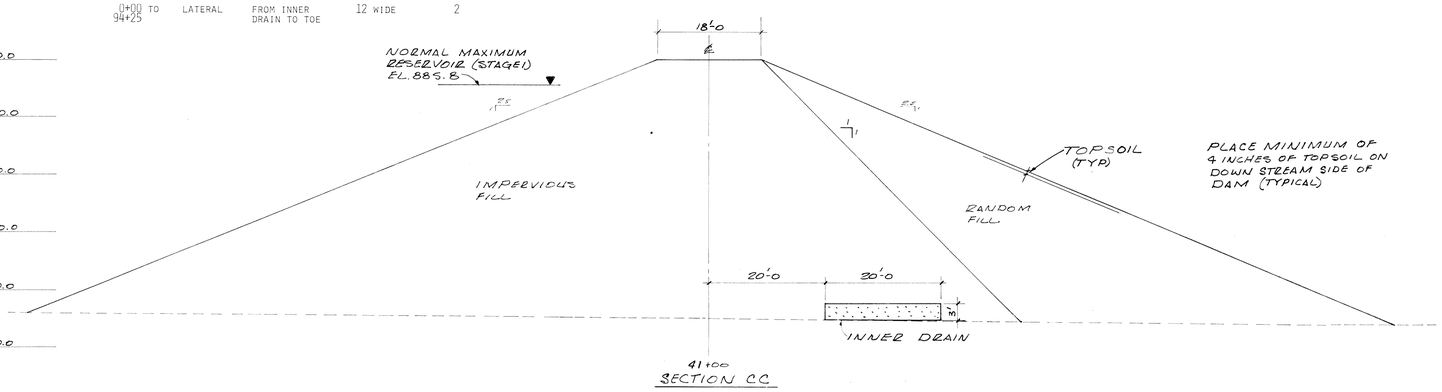
STATIONS		DRAIN TYPE	LOCATION WITHIN DAM	DRAIN LENGTH, FT	DRAIN THICKNESS, FT
0+00 28+00	TO	INNER	15 FT FROM CENTERLINE	15	3
28+00 88+75	TO	INNER	20 FT FROM CENTERLINE	20	3
88+75 94+25	TO	INNER	15 FT FROM CENTERLINE	15	3
94+25 112+00	TO	TOE	25 FT FROM TOE	25	2
112+00 0+00	TO	TOE	20 FT FROM TOE	20	2
0+00 94+25	TO	LATERAL	FROM INNER DRAIN TO TOE	12 WIDE	2

84+50
SECTION DD
℄ EMERGENCY SPILLWAY
(STAGE 1)

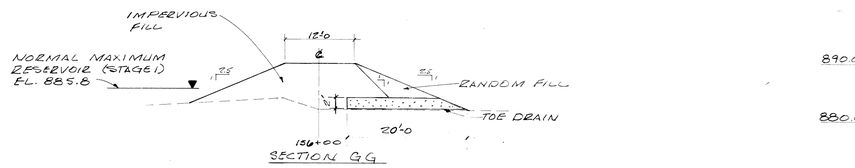


DETAIL A
EMERGENCY SPILLWAY PLAN

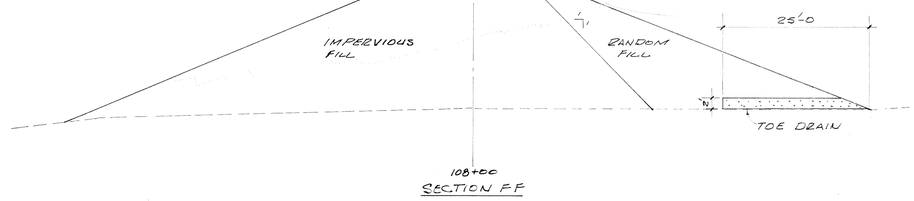
SCALE FEET



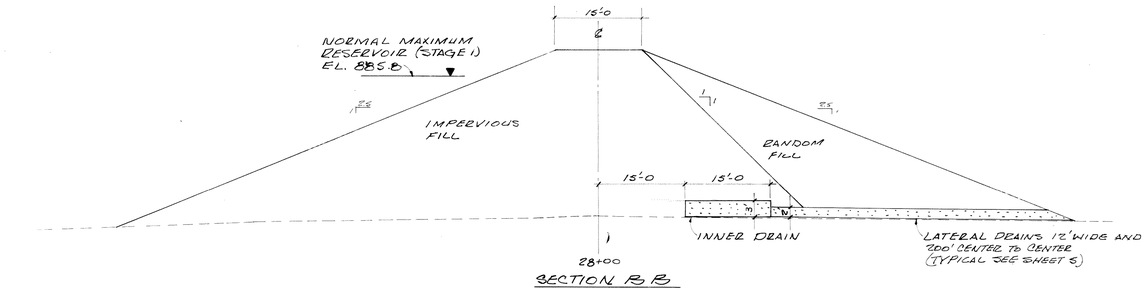
41+00
SECTION CC



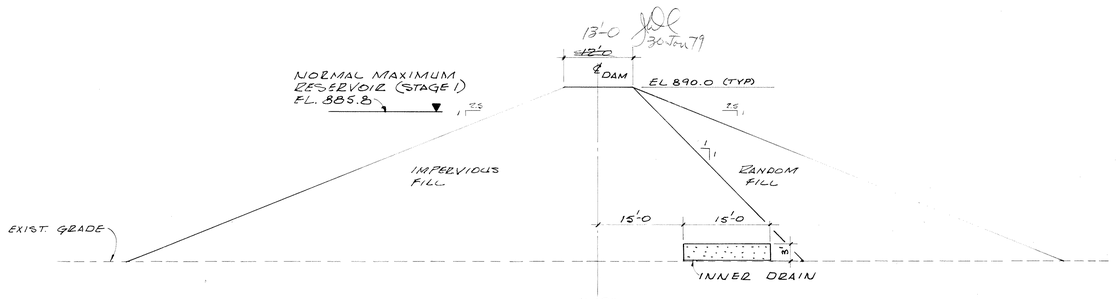
SECTION GG



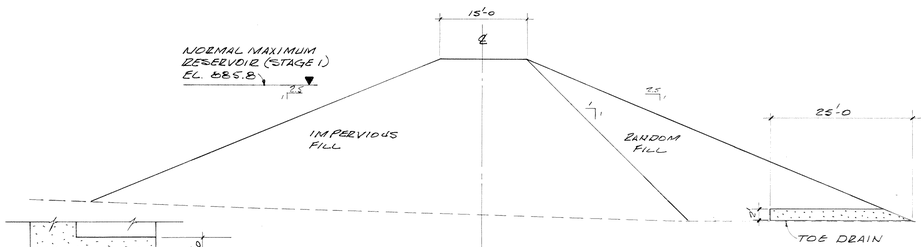
108+00
SECTION FF



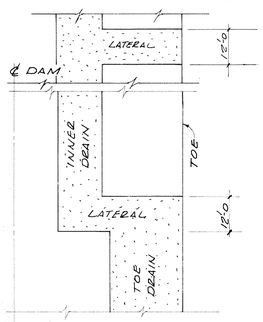
28+00
SECTION RR



11+00
SECTION AA



98+00
SECTION EE



TRANSITIONAL DETAIL
SCALE: 1" = 20'

APPROVED
This 30TH day of JANUARY 19 79
Chief Engineer
Division of Water Resources
State Board of Agriculture

SCALE FEET

NOTES:

1. ALL MATERIALS AND PLACEMENT PROCEDURES SHALL BE IN ACCORDANCE WITH THE TECHNICAL SPECIFICATIONS.
2. ALL DIMENSIONS ARE IN UNITS OF FEET.
3. ELEVATIONS REFERENCED TO USC AND GS DATUM.

KANSAS CITY POWER & LIGHT COMPANY
KANSAS GAS AND ELECTRIC COMPANY
LA CYGNE STEAM ELECTRIC STATION
NEW F.G.D. SLUDGE RETENTION DAM - STAGE 1

DAM EMBANKMENT
SECTIONS AND DETAILS

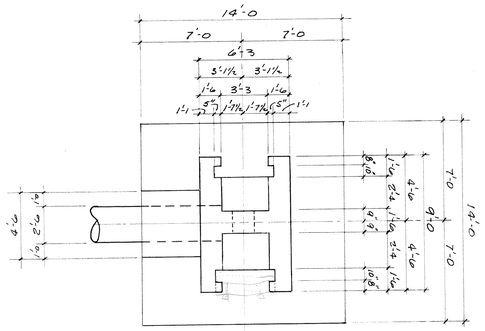
WOODWARD-CLYDE CONSULTANTS KANSAS CITY

SCALE AS SHOWN APPROVED DATE DEC 1978

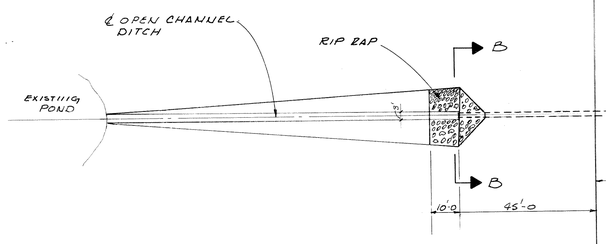
DR. ED CH. JDC

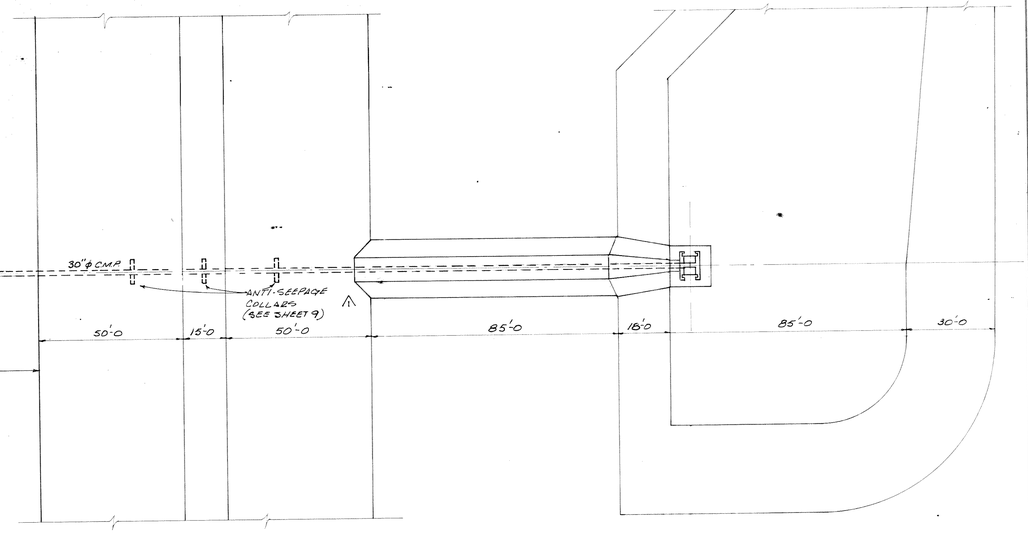
KC 205.80
SHEET 7

NO.	DATE	REVISION	BY	CH.	APPROVED
1	JAN 79	LOCATION OF DRAINS AND ISSUED FOR CONSTRUCTION	ATK	JDC	
0	DEC 78	ISSUED FOR BIDS	ED	JDC	

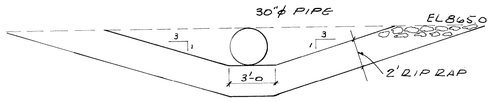


PLAN
SCALE: 1/4"=1'-0

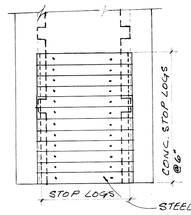




PLAN
SCALE: 1"=20'-0

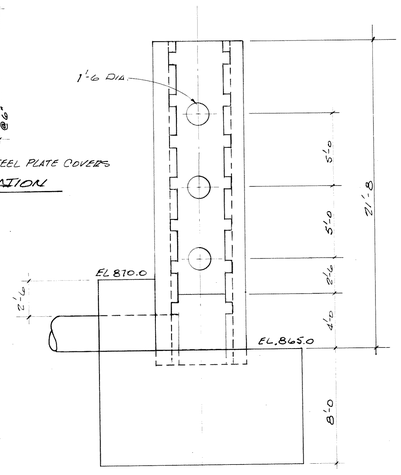


SECTION B-B
SCALE: 1/4"=1'-0



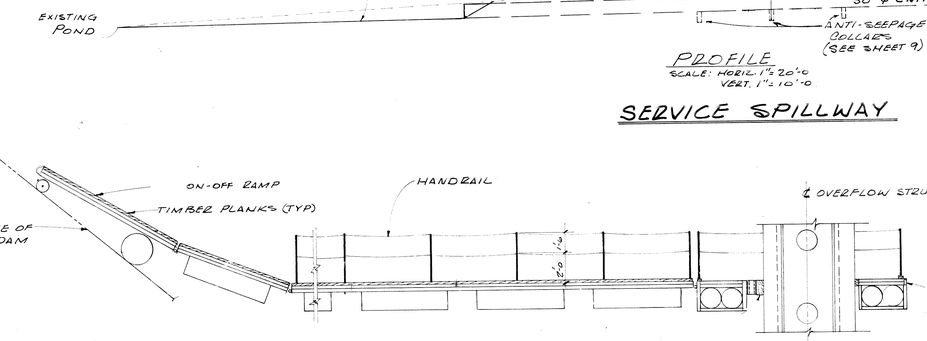
VIEW OF STOPLOG INSTALLATION
SCALE: 3/8"=1'-0

NOTE:
FILL VOID BETWEEN STOPLOG AND COVER PLATE WITH (DRY) CONCRETE MIX AFTER INSTALLING EACH STOPLOG TO MAKE A SEAL

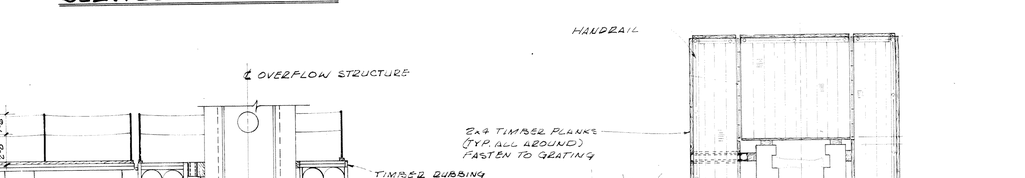


ELEVATION
SCALE: 1/4"=1'-0

OVERFLOW STRUCTURE

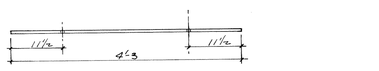


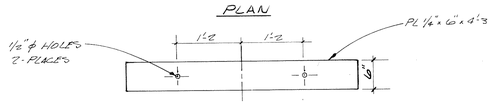
RAMP DETAIL
SCALE: 1/2"=1'-0



PROFILE
SCALE: HORIZ. 1"=20'-0
VERT. 1"=10'-0

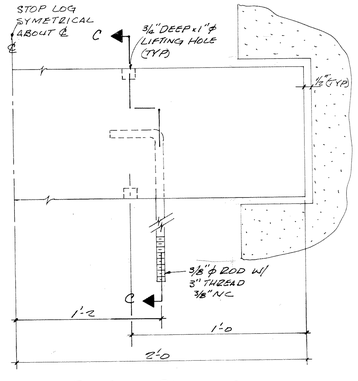
SERVICE SPILLWAY



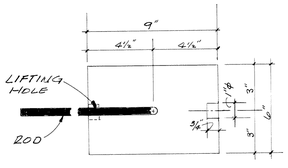


STEEL PLATE STOPLOG COVER
SCALE: 1"=1'-0
(9 REQUIRED)

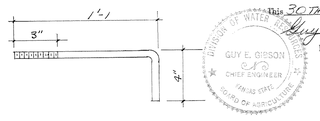
APPROXIMATE LAYOUT FOR FLOATATION SYSTEM
BY OTHERS



PARTIAL PLAN OF STOP LOG (9 REQUIRED)
SCALE: 3"=1'-0

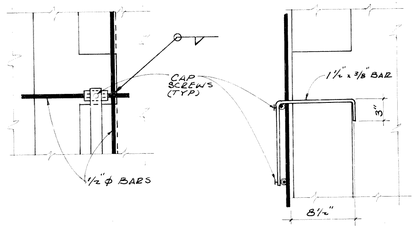


SECTION C-C
SCALE: 3"=1'-0



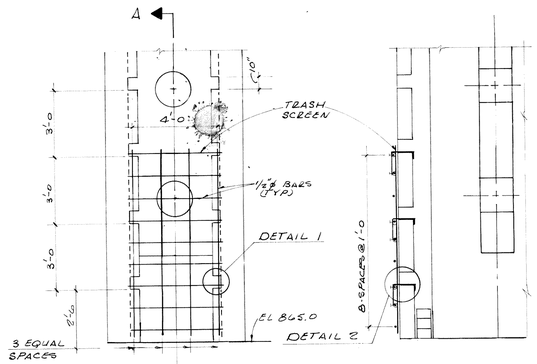
ROD DETAIL
SCALE: 3"=1'-0

DOCK DETAIL
SCALE: 1/4"=1'-0



DETAIL 1
SCALE: 1½"=1'-0

DETAIL 2
SCALE: 1½"=1'-0



ELEVATION
SCALE: 3/8"=1'-0

SECTION A-A
SCALE: 3/8"=1'-0

DETAIL OF TRASH SCREEN
2 REQUIRED

NOTES:
1. ALL MATERIALS AND PLACEMENT PROCEDURES SHALL BE IN ACCORDANCE WITH THE TECHNICAL SPECIFICATIONS.
2. ALL DIMENSIONS ARE IN UNITS OF FEET AND INCHES.
3. ALL EXPOSED CORNERS OF STRUCTURE SHALL HAVE 1 1/2 INCH CHAMFERS. STOPLOGS SHALL NOT BE CHAMFERED.
4. ELEVATIONS REFERRED TO USC AND GS DATUM.

APPROVED
This 30TH day of JANUARY 19 79
Guy E. Gibson by Keller Gordon
Chief Engineer
Division of Water Resources
State Board of Agriculture

GUY E. GIBSON C.E. CHIEF ENGINEER KANSAS STATE BOARD OF AGRICULTURE DIVISION OF WATER RESOURCES

KANSAS CITY POWER & LIGHT COMPANY
KANSAS GAS AND ELECTRIC COMPANY
LA CYGNE STEAM ELECTRIC STATION
NEW F.G.D. SLUDGE RETENTION DAM - STAGE 1
SERVICE SPILLWAY
PLAN, SECTIONS AND DETAILS

WOODWARD-CLYDE CONSULTANTS KANSAS CITY
SCALE: AS SHOWN
APPROVED
DATE DEC 1978
DR. ED
CH. JTC
KC 205.80
SHEET 8

NO.	DATE	REVISION	BY	CH.	APPROVED
1	JAN 79	ANTI-SEEPAGE COLLARS AND ISSUED FOR CONSTRICTION	TJM	KJW	TJM
0	DEC 78	ISSUED FOR BIDS	ED	JTC	JTC